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WAR MACHINE

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Soviet Battlefield Air Support

Harrier in Action

US Anti-Tank Operations on the Central Front

A fully illustrated guide to Modern Attack Aircraft

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WAR MACHINE

Volume 3 **Issue 32**

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WAR MACHINE

Forthcoming issues feature:
Air-to-air Missiles
Cruisers of World War II
Armoured Cars of World War II
Modern Pistols
Night Fighters of World War II

Modern Attack Aircraft

Designed for survival in the close support, tank-busting role, the Fairchild A-10A can absorb massive amounts of battle damage, which it would attract as it flies low over the battleground.

Today's attack aircraft are the real workhorses of modern warfare, flying low and fast over the battlefields and attracting hostile reactions from SAMs and small-arms fire. Not only do they have to cope with this, but their bases are prime targets, so many aircraft have developed the ability to operate away from their home base.

Occupying a broad and ill-defined middle ground between the bomber and the COIN (counter-insurgency) aircraft, the modern attack aircraft represents an attempt to combine the most valuable attributes of both: the heavy weapon load and comprehensive navigation and self-protection systems of the former, plus the latter's lightness and manoeuvrability. Naturally there must be compromises, for this idea is unattainable despite recent advances in aerodynamics and electronics, and so each new aircraft is designed to fulfil a specific need or is adapted from a fighter with certain roles in mind.

Thus, a study of such aircraft reveals a diversity of design philosophies from the slow but well-protected Fairchild Republic A-10 Thunderbolt II to the sleek, Mach 2 Saab Viggen, with every degree of sophistication or simplicity in between. The majority of aircraft perform solely in the close-support or attack roles: that is to say, they carry only conventional weaponry; high explosive or cluster bombs, air-to-surface missiles, rockets and cannon. Often, they have been optimized for short-range operations over the battlefield or as far as the enemy's forward airfields and supply dumps, flying in the tactical role. Close air support is a sub-division of this category (to which the BAe Harrier is ideally suited) sometimes involving attacks under the supervision of a forward air controller to take out targets which may be a very short distance from friendly troops in the field.

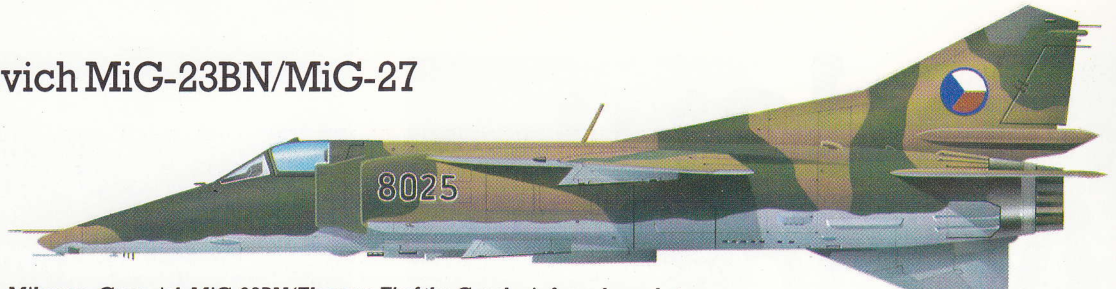
Faster, more advanced types, normally equipped with radar and other aids to all-weather operation, have the additional option of carrying nuclear weapons, and as such are classified as strike aircraft. The definitions 'strike' and 'attack' are often confused, as some aircraft fall into both categories, and others could. For example, the Viggen would make an excellent strike aircraft, but is in the attack category only because Sweden does not possess nuclear weapons. Many attack types also find useful employment in the tactical reconnaissance role, whilst the USAF has modified some of its McDonnell Douglas F-4 Phantoms to the highly-specialized 'Wild Weasel' task of knocking out enemy radars. These, too, merit inclusion in this review of battlefield workhorses of the air war.

Painted in temporary winter markings, these No. 1 Sqn Harrier GR.Mk 3s are seen on a NATO exercise in Norway. Training such as this prepared the squadron for the harsh weather encountered in the South Atlantic.

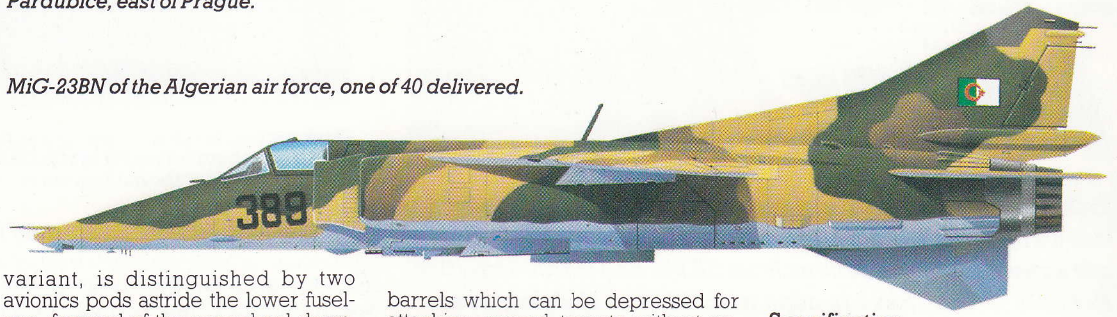
USSR

Mikoyan-Gurevich MiG-23BN/MiG-27

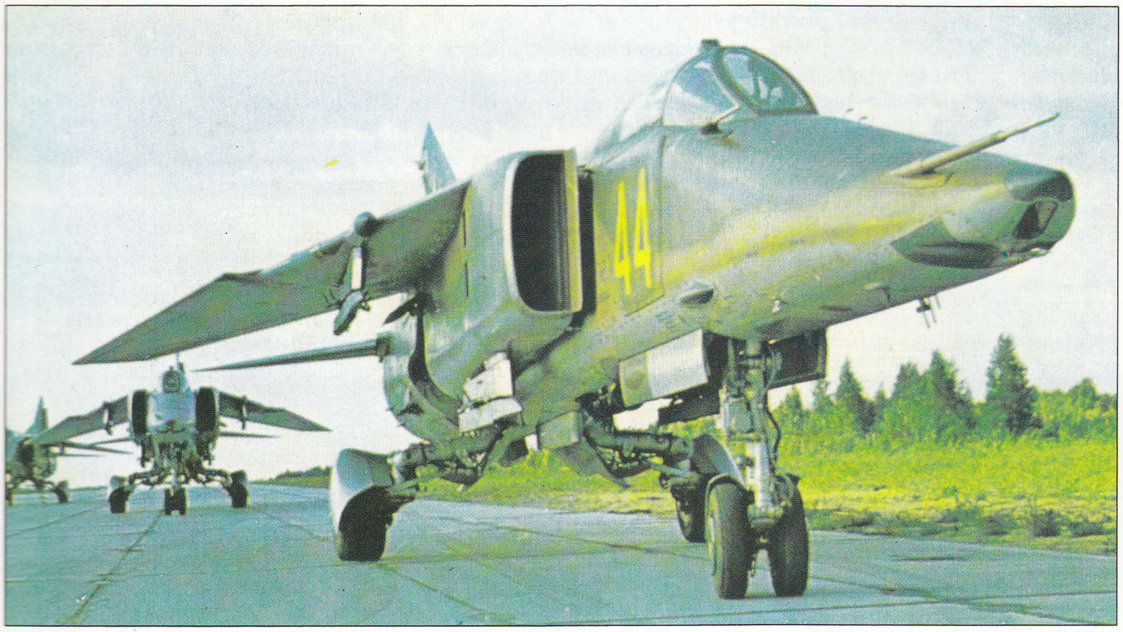
A specialized ground-attack version of the MiG-23 fighter, with which it shares the NATO reporting name 'Flogger', the **Mikoyan-Gurevich MiG-27** differs from its companion in some respects. The most significant of these are the fixed-geometry air inlets and afterburner nozzles, which indicate a simplicity of design permitted by the mission requirement of only transonic speed, compared with Mach 2.35 attainable by the MiG-23. First of the MiG-27 variants, the **MiG-27 'Flogger-D'** features a nose sharply tapered from the windscreen and containing a laser ranger and marked-target seeker, whilst a six-barrel 23-mm gun is positioned beneath the belly. Pilot vision is improved for attack missions by a raised seat and canopy, and low-pressure tyres are compatible with rough-field operation. Issued in quantity to the Soviet tactical air force, Frontal Aviation, the 'Flogger-D' has an export counterpart in the **MiG-23BN 'Flogger-F'**, which retains the original 125070-kg (27,557-lb) R-29 afterburning turbojet (plus variable inlets and nozzle) and twin-barrel cannon. The similar **MiG-23BN 'Flogger-H'**, another 'high-speed' variant, is distinguished by two avionics pods astride the lower fuselage, forward of the nosewheel doors. In 1981, the **MiG-27 'Flogger-J'** was first noted, this differing from the 'Flogger-D' in further nose revision, with a lip on the top and a blister fairing beneath. Podded guns on two wing pylons have barrels which can be depressed for attacking ground targets without recourse to a steep dive. India has acquired a production licence for the 'Flogger-J' and will begin manufacture in 1985.



Mikoyan-Gurevich MiG-23BN 'Flogger-F' of the Czech air force based at Pardubice, east of Prague.



MiG-23BN of the Algerian air force, one of 40 delivered.



Specification
MiG-27 'Flogger-D'

Type: single-seat variable-geometry ground attack and tactical nuclear strike aircraft

Armament: one fixed six-barrel 23-mm gun; five weapon pylons and two rear-fuselage racks for stores including AS-7 'Kerry' ASMs and self-defence AA-2 'Atoll' AAMs up to a maximum weight of at least 4000 kg (8,820 lb)

Powerplant: one 11500-kg (25,353-lb) thrust Tumansky R-29B afterburning turbojet

Performance: maximum speed Mach 1.5 at altitude; maximum speed Mach 1.1 at sea level; service ceiling 16000 m (52,495 ft); combat radius on a lo-lo-lo mission 390 km (242 miles) with four 500-kg (1,102-lb) bombs and two AA-2s

Weight: maximum take-off 18000 kg (39,863 lb)

Dimensions: span, full extension (16° sweep) 14.25 m (46 ft 9 in), fully swept (72°) 8.17 m (26 ft 9½ in); length 16.00 m (52 ft 6 in); height 4.35 m (14 ft 4 in) wing area, spread 27.26 m^2 (293.4 sq ft)

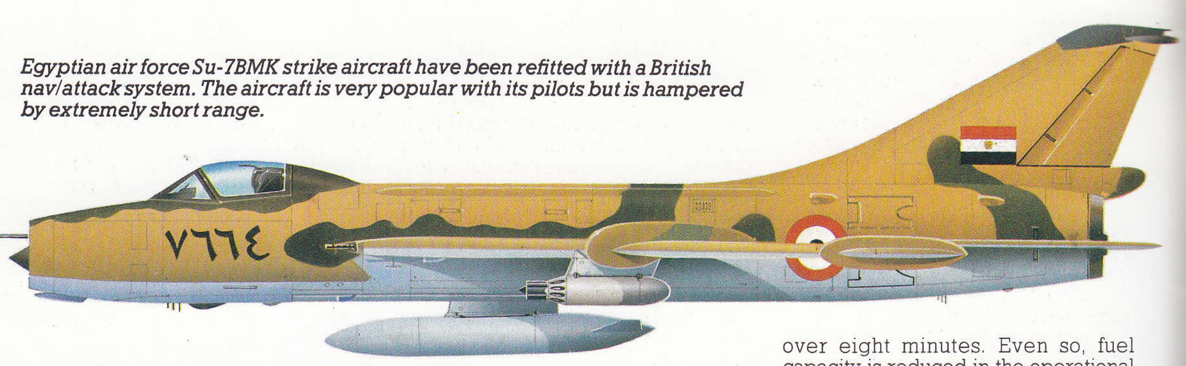
AS-7 'Kerry' missiles can be carried by the MiG-27 on fuselage and glove pylons. The protrusion on the wing leading edge above the pylon is believed to be connected with this air-to-surface missile.

USSR

Sukhoi Su-7

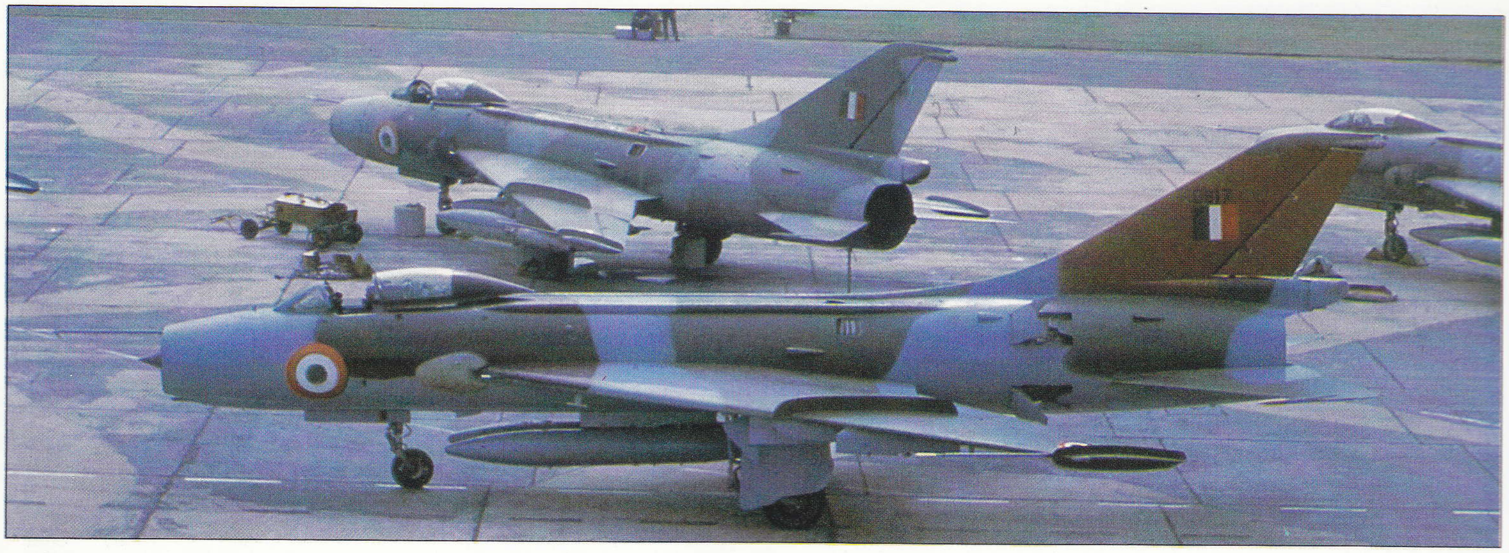
Though criticized for its poor payload/range capabilities, the obsolescent **Sukhoi Su-7** possesses the saving graces of excellent handling qualities, good low-level gust response and manoeuvrability. Remaining in service with 15 air arms, although almost replaced within Soviet front-line units, it has seen action on several occasions during wars in the Middle East and Indian sub-continent. First flown in 1955, the aircraft entered service four years later in its **Su-7B** form, under the NATO reporting name **'Fitter-A'**, and rapidly established itself as the standard fighter-bomber of the Soviet air force and some Warsaw Pact allies. Three progressively improved models followed, but featured insufficient changes to warrant a change of Western designation. In the **Su-7BM**, underwing stores pylons were doubled to four; the muzzle velocity of the internal cannon was increased; and an uprated engine was fitted, take-off power being further boosted, if required, by two JATO bottles. The aircraft also introduced a radar warning receiver in the tail and two duct fairings running long the spine. Rough-field operation was provided in the **Su-7BKL**, whose large, low-pressure nosewheel tyre is betrayed by a blistered floor to its bay. Further changes of detail were incorporated in the later **Su-7BMK**, but little could be done to moderate the demands of the thirsty AL-7F engine, which on full afterburner at sea level would consume the entire 2940 litres (647 Imp gal) of internal fuel in a little over eight minutes. Even so, fuel capacity is reduced in the operational trainer versions (**Su-7UM** and **Su-7UMK**, known to NATO as **'Moujik'**) to make way for a second seat, despite a slight lengthening of the fuselage.

Egyptian air force Su-7BMK strike aircraft have been refitted with a British nav/attack system. The aircraft is very popular with its pilots but is hampered by extremely short range.



Specification
Su-7BMK 'Fitter-A'

Type: single-seat ground-attack fighter



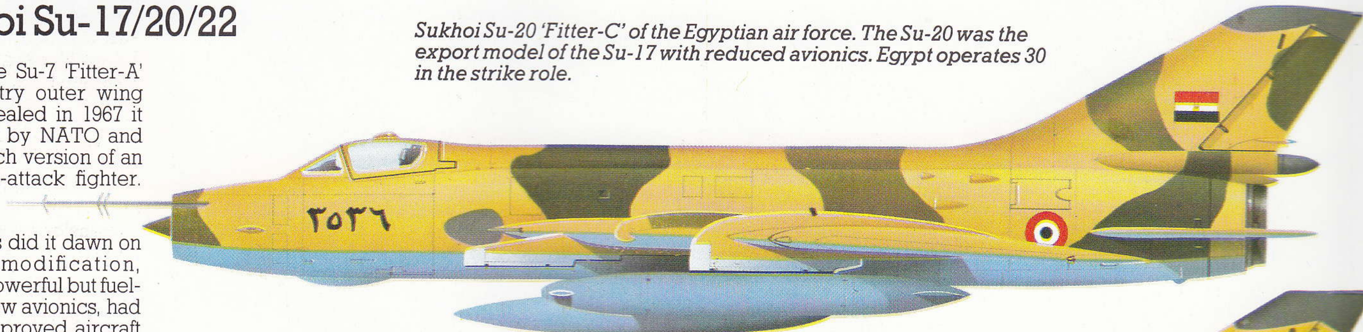
These Su-7BMs are parked outside the flight office of No. 122 Sqn, Indian Air Force. Seventy-five are still used in the strike role, but Jaguars are replacing them.

Armament: two 30-mm NR-30 cannon (with 70 rpg) in wing roots; six weapon pylons: two under fuselage and two under the inner wings, each carrying up to 500 kg (1,102 lb) of stores, plus two under the outer wings each carrying up to 250 kg (551 lb); weapon load reduced to 1000 kg (2,205 lb) when two 600-litre (132-Imp gal) drop-tanks are carried on fuselage pylons
Powerplant: one 10000-kg (22,046-lb) thrust Lyulka AL-7F-1 afterburning turbojet
Performance: maximum speed at sea level 850 km/h (528 mph) without afterburning, or 1350 km/h (839 mph) with afterburning; initial climb rate 9120 m (29,920 ft) per minute; service ceiling 15150 m (49,705 ft)
Weights: empty 8620 kg (19,004 lb); normal take-off 12000 kg (26,455 lb); maximum take-off 13500 kg (29,762 lb)
Dimensions: span 8.93 m (29 ft 3½ in); length, including probe 17.37 m (57 ft 0 in); height 4.57 m (15 ft 0 in); wing area 27.60 m^2 (297 sq ft)

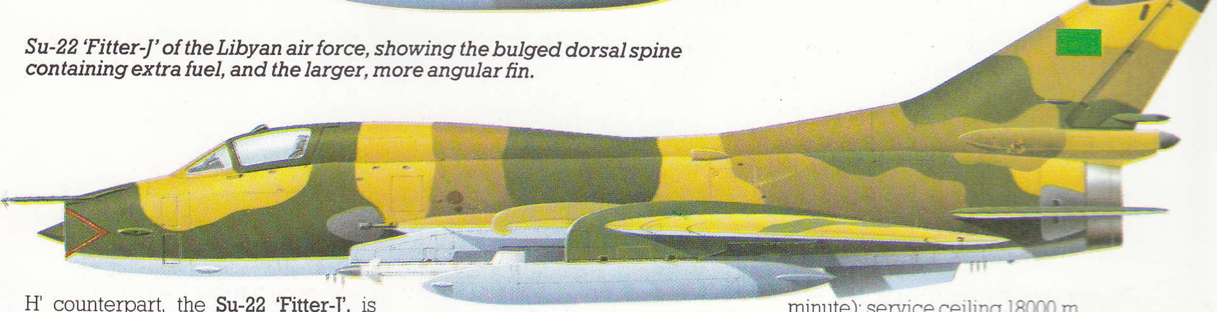
USSR

Sukhoi Su-17/20/22

When a version of the Su-7 'Fitter-A' with variable-geometry outer wing sections was first revealed in 1967 it was labelled **'Fitter-B'** by NATO and dismissed as a research version of an unimpressive ground-attack fighter.



Sukhoi Su-20 'Fitter-C' of the Egyptian air force. The Su-20 was the export model of the Su-17 with reduced avionics. Egypt operates 30 in the strike role.



Su-22 'Fitter-J' of the Libyan air force, showing the bulged dorsal spine containing extra fuel, and the larger, more angular fin.

Not until the mid-1970s did it dawn on the West that the modification, together with a more powerful but fuel-efficient engine and new avionics, had resulted in a vastly improved aircraft with doubled weapon load, 30 per cent greater range and substantially better short-field take-off characteristics. So successful has been the aircraft that numerous versions are in service with Frontal Aviation, the Soviet naval air arm, Warsaw Pact and left-leaning countries abroad. **Sukhoi Su-17** variants based in eastern Europe and the USSR have been progressively improved from the basic **'Fitter-C'** initial-production model, firstly to the **'Fitter-D'** with its undernose terrain-avoidance radar and a marked-target seeker in the inlet centrebody. A conversion trainer, the **'Fitter-E'**, parallels the 'Fitter-C' except for a slightly drooped forward fuselage and lack of a port wing root gun, whilst the **'Fitter-G'** operational trainer has a taller, straight-topped fin and a marked-target seeker. Newest of the single-seat variants is the **'Fitter-H'** which has the revised fin and a deep dorsal fairing behind the canopy, presumably for extra fuel tanks. Export versions of the 'Fitter-C' have a reduced avionics fit and are designated **Su-20**, but when the **Su-22 'Fitter-F'** appeared as a 'Fitter-D' counterpart, its bulged rear fuselage revealed a change of engine to the 11500-kg (25,353-lb) thrust Tumansky R-29B afterburning turbojet for even better performance. A 'Fitter-H' counterpart, the **Su-22 'Fitter-J'**, is similarly powered and identified by a more angular dorsal fin. Su-22s are also employed as interceptors with AA-2 'Atoll' AAMs. A Tumansky-powered two-seater has been noted in Soviet service.

Specification

Su-17 'Fitter-C'
Type: single-seat variable-geometry ground-attack fighter
Armament: two 30-mm NR-30 cannon (with 70 rpg) in wing roots; four underwing and four underfuselage weapon pylons for up to 4000 kg (8,818 lb) of ordnance including tactical nuclear weapons and AS-7 'Kerry' ASMs
Powerplant: one 11200-kg (24,691-lb) thrust Lyulka AL-21F-3 afterburning turbojet
Performance: maximum speed 2300 km/h (1,429 mph) or Mach 2.17 at altitude; maximum speed 1285 km/h (798 mph) or Mach 1.05 at sea level; initial climb rate 13,800 m (45,275 ft per minute); service ceiling 18000 m (59,055 ft); combat radius with 2000 kg (4,409 lb) of stores 630 km (391 miles) on a hi-lo-hi mission, or 360 km (224 miles) on a lo-lo-lo mission
Dimensions: span, extended (28° sweep) 14.00 m (45 ft 11 in), fully-swept (62°) 10.60 m (34 ft 9½ in); length 18.75 m (61 ft 6¼ in); height 4.75 m (15 ft 7 in); wing area, extended 40.1 m^2 (432 sq ft)

Exported in 1976, this Egyptian Su-20 was refurbished in 1982 and brought back to operational status. Egypt was a major user of Soviet equipment but has bought F-16s and Mirage 2000s.

Soviet Battlefield Air Support

Whereas the Western powers must rely on technology, the Soviet Union deploys vast numbers of aircraft to suppress battlefield targets. Chief weapons are the MiG-27 armed with AS-7 'Kerry' missiles and the new close-support Su-25 'Frogfoot', developed for a role similar to that of the USA's A-10.

Whilst the West devotes considerable effort towards divining the minute details of Soviet intentions and capabilities, intelligence services are already aware of the basic plan of any future assault on the Free World. Not only are the broad tactics known, but also the precise data of their origin: 22 June 1941.

It was on this day 43 years ago that Hitler invaded his former ally, the Soviet Union, the Luftwaffe establishing massive air superiority above the advancing German army and shattering its counterpart in the air and on the airfields. These tactics almost annihilated the air and land forces of the USSR and left no doubt in the minds of post-war military planners that the *Blitzkrieg* is by far the most effective form of assault.

Should the Warsaw Pact march against Western Europe in a war of conventional or limited NBC (nuclear, biological and chemical) weaponry, it will firstly have the aggressor's privilege of choosing the time of attack. Again, no secret is made of the basics of timing: it will be on, or shortly before a weekend or holiday, unless the build-up of diplomatic tension has been sufficiently sustained to allow NATO forces to be placed on full alert. The Soviet Union has also vowed publicly that no battles will be fought on its own territory, meaning that conflict will take place on Western European ground or that of Warsaw Pact allies. Naturally, the former is preferred.

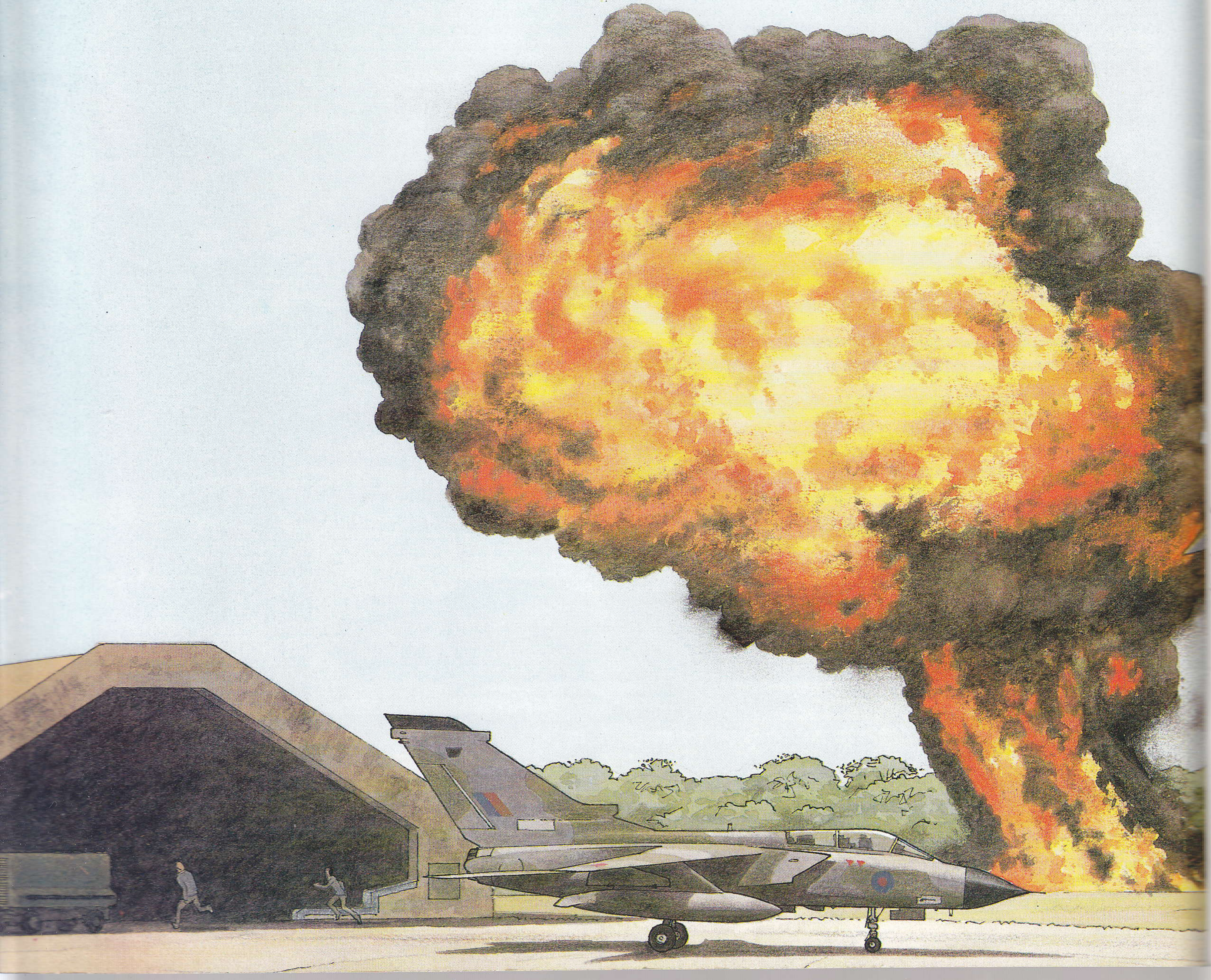
As the Soviet armies move forward, their air support will endeavour to eliminate threats before they can materialize, or counter them before they are able to press home an attack. This will require pre-emptive action against airfields and other military targets, and establishment of a defensive curtain around the battle zone and rear areas.

Provision of the air assets for these operations will be the responsibility of Frontal Aviation (Frontovaya Aviatsiya), a component of the Soviet air forces, whose aircraft are assigned to Frontal Air Armies under the control of the local army group commander. Some 5,000 fixed-wing aircraft and 3,250 helicopters form Frontal Aviation, and up to 70 per cent of these are based in Eastern Europe (including the westernmost Military Districts of the USSR).

In the unusual structure of the Soviet armed forces there is a separate air defence service whose role it is to protect the homeland, and Frontal Aviation has its own distinct air-superiority force. The versatile Mikoyan-Gurevich MiG-21 in its 'Fishbed-J, -K, -L and -N' models, with up to four AA-2 'Atoll' or AA-8 'Aphid' AAMs, is being replaced as an interceptor by the MiG-23 'Flogger-B and -G' with two AA-7 'Apex' and four AA-8 'Aphid' missiles, but where circumstances permit, the MiG-21 will also operate in the support role with rocket pods and bombs.

Prospective equipment for Frontal Aviation includes the MiG-29 'Fulcrum' and Sukhoi Su-27 'Flanker', these approximate and respective counterparts to the McDonnell Douglas F-18 Hornet and McDonnell Douglas F-15 Eagle having look-down/shoot-down capability. Both are believed to be on the point of entering service, although it is not yet known whether first deliveries will be made to home-defence or Frontal Aviation units.

In the past decade or so, the Frontal Air Armies have been transformed from essentially protective formations into offensive weapons of some magnitude. However, before the main force goes into battle, it will be preceded by other



aircraft whose contribution to the success of any operation is often underestimated.

Reconnaissance tasks are assigned to the MiG-21 'Fishbed-H', MiG-25 'Foxbat-B and -D' and a few remaining examples of the Yakovlev Yak-28 'Brewer D', whilst electronic countermeasures (ECM) are the responsibility of the 'Brewer-E'. The Warsaw Pact has its own version of the 'Wild Weasel' tactic of defence-suppression with or slightly in advance of an air strike, and such would include 'Brewer-E' and other suitably-modified aircraft. Wherever possible, attacks would be made in poor weather or at night to reduce the threat from visually-aimed SAM systems.

All-weather combat force

Apart from a few ageing Sukhoi Su-7 'Fitter A' aircraft, the air support force is also capable of interdiction: that is to say, accurate penetration in some depth of enemy lines. MiG-21 'Fishbed-C, -D and -F' variants and Su-24 'Fencer-A' aircraft are reserved primarily for interdiction, whilst the Su-17 'Fitter-C, -D and -H' and MiG-27 'Flogger-D' would also double up as support fighters for attacks on battlefield targets. Weaponry includes the usual cannon and bombs, plus rocket packs and ASMs such as the AS-7 'Kerry'.

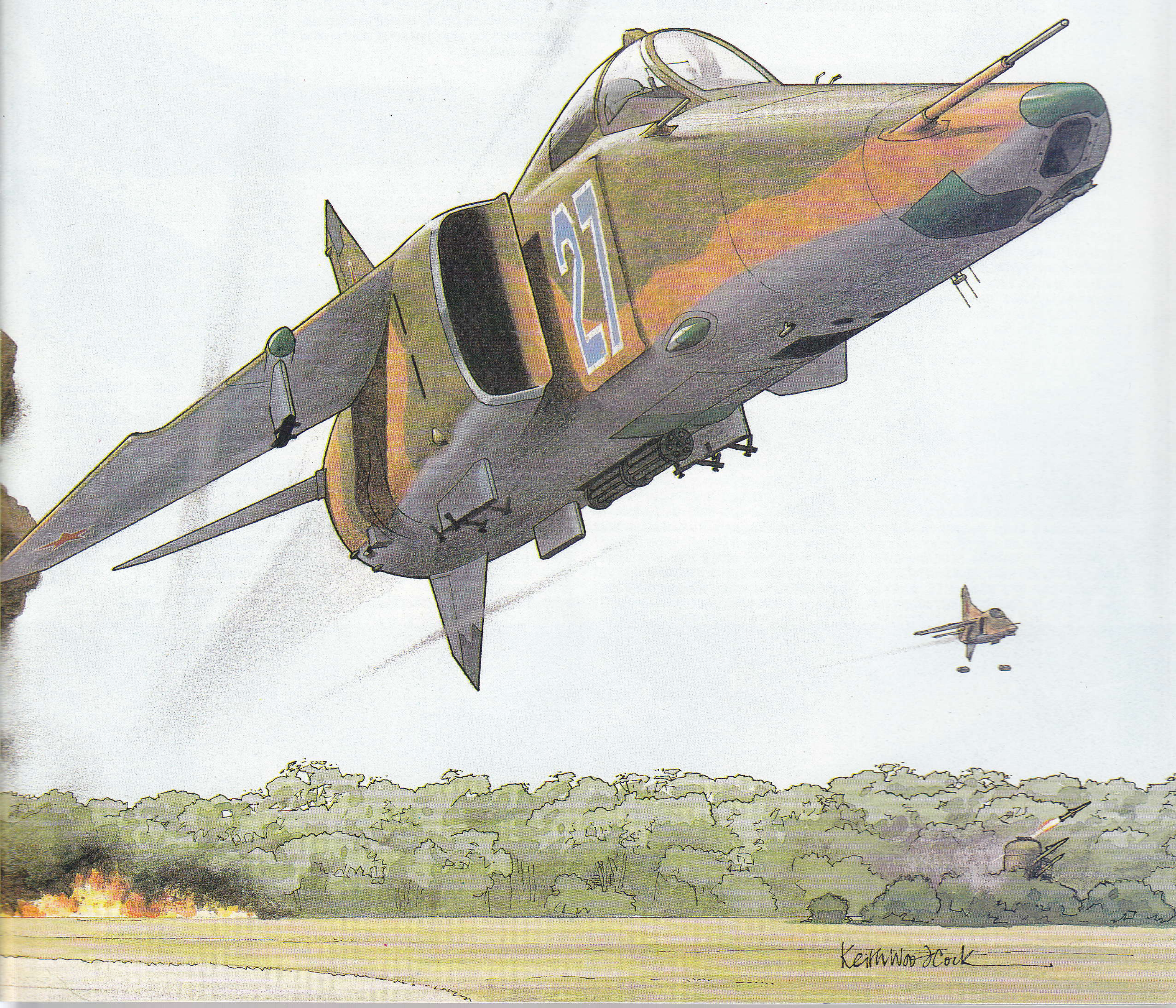
Undergoing operational trials in Afghanistan since at least 1982, the Su-25 'Frogfoot' close-support aircraft may shortly appear on the Central Front. Similar in concept to the Fairchild A-10A Thunderbolt, it is expected to introduce a new form of tactical operation to Frontal Aviation: that of co-ordinated close support with Mil-24 'Hind' helicopter gunships.

Helicopters have a vital role to play on the battlefield, the element of surprise being provided by the well-rehearsed ability to land troops, supplies and equipment behind enemy lines less than 20 minutes after a bombardment or NBC attack. The Mi-8 'Hip' carries up to 32 men, and in its 'Hip-E' version lays claim to being the world's most heavily-armed helicopter sporting AT-2 'Swatter' missiles, pods for 192 rockets and a machine-gun, whilst the Mi-24 'Hind' takes the dual-role concept further.

Originally, the 'Hind-A' transported eight troops and carried similar armament to the Mi-8, but the latest versions are primarily gunships with the addition of a chin-mounted rotary-cannon turret or starboard side cannon pack, AT-6 'Spiral' missiles and sophisticated target-acquisition sensors. Heavy-lift transport is provided by the Mi-6 'Hook', and a few Mi-2 'Hoplite' and Mi-4 'Hound-A' helicopters assist with airlift, the 'Hound-C' being an ECM and electronic intelligence-gathering (Elint) variant.

Having usefully employed the 1970s period of 'détente' with the West to build up Frontal Aviation, the Soviet Union now has a powerful tactical air arm at its disposal. Optimized for support of an advancing army and with the additional capability to attack targets well behind the battle line, Frontovaya Aviatsiya is by its size and composition an overtly offensive force optimized to emulate the spectacular success of the *Blitzkrieg* form of attack.

A Tornado goes up in smoke as a Soviet MiG-27 continues its attack run against a forward RAF base in Germany. Capable of supersonic speed at ground level, the MiG-27 is armed with six-barrelled underfuselage cannon delivering 23-mm rounds at 6,000 rounds per minute, and can carry a wide range of offensive stores including tactical nuclear weapons. Unlike Allied aircraft, the MiG-27 can operate away from its own base by virtue of its tough, rough-field capability.



USSR

Sukhoi Su-25

Expansion of Soviet tactical air strength during the 1970s kept the West on the lookout for new combat aircraft, satellite reconnaissance of the Ramenskoye test centre revealing a number of designs in the early stages of flight development. Amongst these was an aircraft resembling the Northrop A-9, and as the A-9 was an unsuccessful contender in the competition which brought the Fairchild A-10 Thunderbolt II into USAF service, the Soviet machine's close-support role was readily apparent. Originally known to NATO as the **Ram-J** (tenth new type seen at Ramenskoye), it was identified subsequently as the **Sukhoi Su-25** and issued with the fighter-classification reporting name **'Frogfoot'**. By 1982, a trials squadron was operating in Afghanistan against tribesmen opposing the Soviet occupation. This opportunity has been taken to develop operational techniques, including co-ordinated low-level attacks by Mil Mi-24 Hind helicopter gunships and Su-25s in support of ground troops. Smaller than the Thunderbolt, and perhaps with engines of lower thrust, the Su-25 appears to carry less weight of ordnance than its American counterpart, although performance is probably better. Deliveries to operational units of Frontal Aviation in the western USSR and eastern Europe were understood to be scheduled to begin in 1983-4.

Specification

Su-25 'Frogfoot'

Type: single-seat close-support aircraft

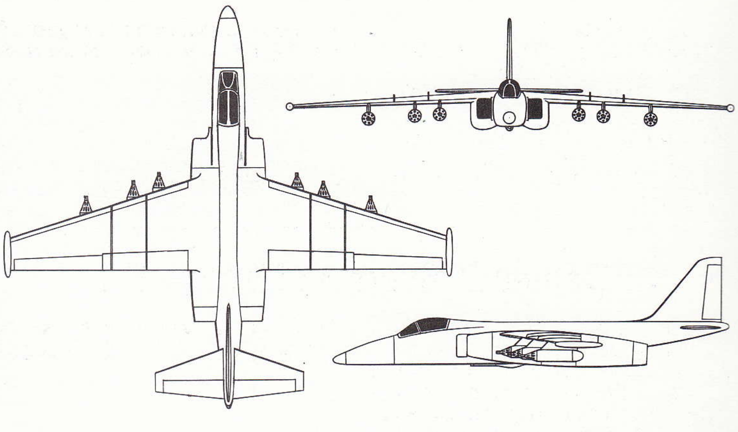
Armament: one multi-barrel cannon beneath the centre fuselage; 10 hardpoints for some 4000 kg (8,818 lb) of ordnance

Powerplant: two non-afterburning turbojets each of up to 4100-kg (9,038-lb) thrust

Performance: maximum speed about 880 km/h (547 mph); combat radius about 550 km (342 miles)

Weight: maximum take-off 16300 kg (35,935 lb)

Dimensions: span 15.50 m (50 ft 10 in); length 14.50 m (47 ft 6 in)

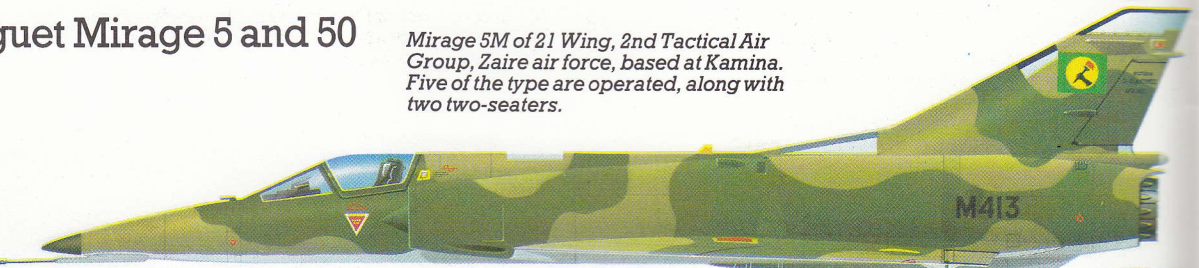


Only blurred pictures of the Su-25 'Frogfoot' have been released, but they have been enough to produce a provisional diagram, showing general layout.

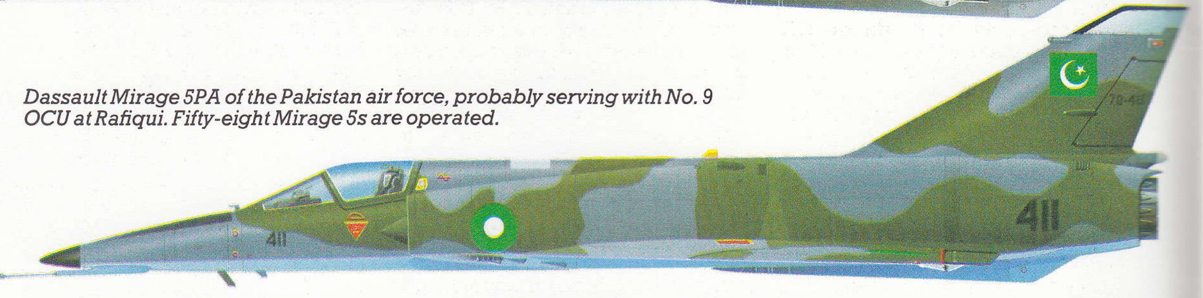
FRANCE

Dassault-Breguet Mirage 5 and 50

Responding to Israeli suggestions, Dassault-Breguet produced a simplified (and thus cheaper) version of its highly successful Mirage III, the new variant, designated **Dassault-Breguet Mirage 5**, making its first flight on 19 May 1967. Optimized for visual ground attack and interception, the aircraft lacked several features of its Mirage IIIE progenitor, notably the Cyrano II nose-mounted radar (replaced by a simple radar rangefinder) and other avionics. Retaining Mach 2 performance and the ability to operate from semi-prepared strips, the Mirage 5 emerged with certain enhancement, such as greater range, easier maintenance and no less than seven weapon attachment points beneath its fuselage and wings. No sooner had this simplification been achieved, and the first of many orders booked, than the process began of developing a family of aircraft based on the Mirage 5 and incorporating various degrees of sophistication according to customer preference. After the camera-nosed **Mirage 5R** and two-seat **Mirage 5D** trainer came versions equipped with SAGEM inertial navigation and nav/attack systems incorporating a head-up display and the choice of Aïda II radar and an air-to-surface laser ranger or Agave multi-purpose radar. These options produced a plethora of sub-marks, some of which were almost indistinguishable from the Mirage III, such as the Egyptian **Mirage 5E2** which incorporate the nav/attack system of the Alpha Jet MS2. The next evolutionary step was to replace the 6200-kg (13,668-lb) thrust Atar 9C afterburning turbojet by a more powerful Atar 9K-50 to produce the **Mirage 50**, first flown on 15 April 1979 and exemplified by the non-radar **Mirage 50FC** and radar-equipped **Mirage 50C** delivered to Chile. The Mirage 50's usual radar fit is Agave or Cyrano IV, allowing the aircraft to operate in the attack or interceptor modes. Current models offered by Dassault are the **Mirage 3-50** and **Mirage 5-50** versions of the Mirage III and Mirage 5, both of which are powered by Atar 9K-50 engines.



Mirage 5M of 21 Wing, 2nd Tactical Air Group, Zaire air force, based at Kamina. Five of the type are operated, along with two two-seaters.



Dassault Mirage 5PA of the Pakistan air force, probably serving with No. 9 OCU at Rafiqui. Fifty-eight Mirage 5s are operated.

Specification

Mirage 5-50

Type: single-seat multi-mission fighter

Armament: two 30-mm DEFA cannon (with 125 rpg) in fuselage; five weapon pylons for ASMs, rocket pods and various bombs to a weight of 4000 kg (8,818 lb) or more

Powerplant: one 7200-kg (15,873-lb) thrust SNECMA Atar 9K-50 afterburning turbojet

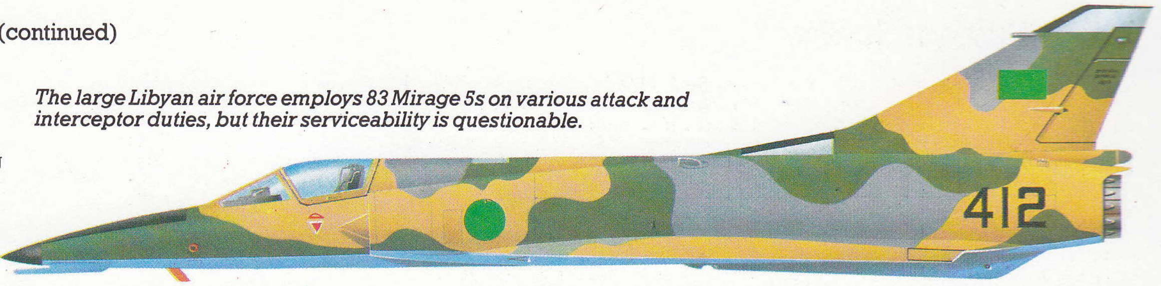
Performance: maximum speed 2350 km/h (1,460 mph) or Mach 2.2 at altitude; maximum speed 1390 km/h (863 mph) or Mach 1.13 at sea level: initial climb rate 11100 m (36,415 ft) per minute; service ceiling 18000 m (59,055 ft); combat radius on a lo-lo-lo mission with 800 kg (1,764 lb) of bombs

South America has been a good market for Dassault-Breguet to sell their Mirage range, whose relatively low price and high performance combines with France's competitiveness. Venezuela operates seven Mirage 5s.

Dassault-Breguet Mirage 5 and 50 (continued)

630 km (391 miles)
Weights: empty 7150 kg (15,763 lb); normal take-off, clean 9900 kg (21,825 lb); maximum take-off 13700 kg (30,203 lb)
Dimensions: span 8.22 m (27 ft 0 in); length 15.56 m (51 ft 0½ in); height 4.50 m (14 ft 9 in); wing area 35.00 m² (376.7 sq ft)

The large Libyan air force employs 83 Mirage 5s on various attack and interceptor duties, but their serviceability is questionable.

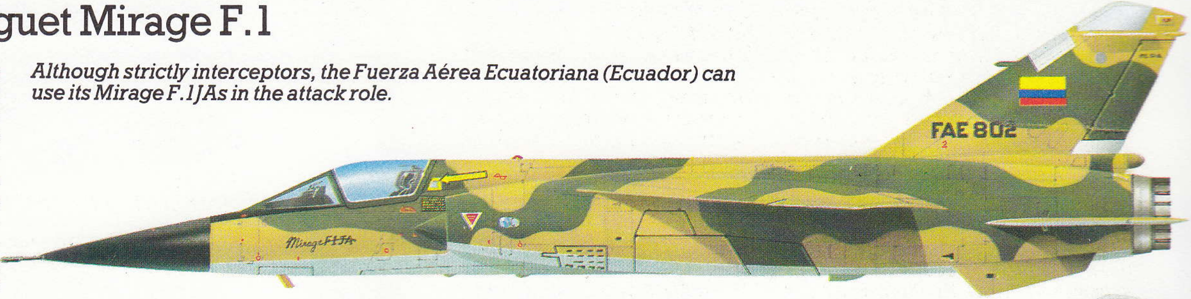


FRANCE

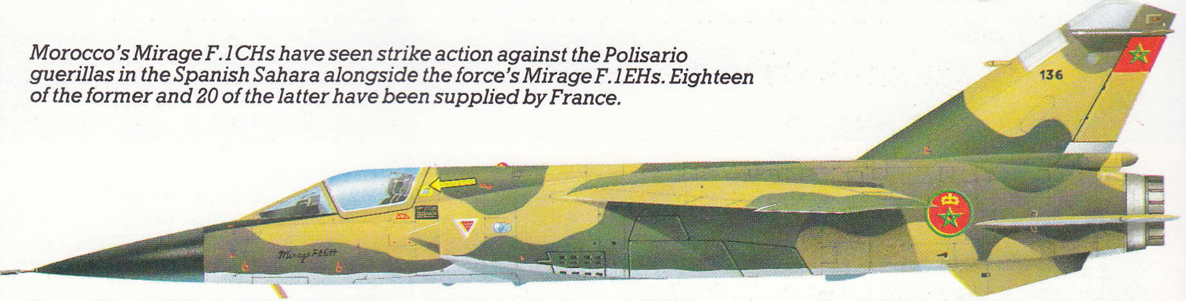
Dassault-Breguet Mirage F.1

When Dassault-Breguet Aviation was commissioned to produce a successor to its versatile Mirage III, doubts with regard to the viability of the air force specification were resolved by building two designs: the private-venture **Dassault-Breguet Mirage F.1** and the officially-inspired Mirage F.2. The larger, heavier Mirage F.2 was consigned to posterity once the Mirage F.1 (first flown on 23 December 1966) had proved itself to be an agile and capable interceptor well suited to additional employment in the attack role. Naturally, the home air force is the major operator of the Mirage F.1, almost 700 of which have been ordered by a total of 11 countries. The **Mirage F.1C** entered service with France's air defence command (CAFDA) in 1973, equipped with Thomson-CSF Cyrano IV all-sector fire-control radar. Production of 81 of this variant was followed by 89 **Mirage F.1C-200** fighters fitted with a fixed inflight-refuelling probe at the base of the windscreen, whilst 20 **Mirage F.1B** conversion trainers (based on the Mirage F.1C but lacking its internal cannon) have also been received. The tactical reconnaissance **Mirage F.1CR**, which entered service in 1983, is based on the Mirage F.1C-200 and has a secondary attack capability, its prime sensors being three internal cameras (including one panoramic and one infra-red linescan) and a range of specialized pods attached to the centreline pylon. Mirage F.1C variants serve with the air forces of Ecuador, Greece, Jordan, Kuwait, Morocco, South Africa and Spain. A simplified version, lacking certain avionics such as the Cyrano radar, was produced for South Africa and Libya as the **Mirage F.1A**, although the latter country, together with Iraq, Jordan, Morocco, Qatar and Spain, also bought the multi-role **Mirage F.1E**. This carries a wide variety of underwing stores as an alternative to AAMs and features inertial navigation, a central nav/attack computer, and additional air-ground modes for its Cyrano IV radar for low-altitude penetration and accurate target ranging.

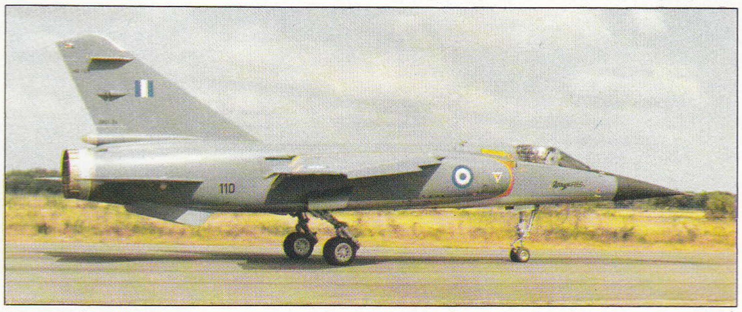
Although strictly interceptors, the Fuerza Aérea Ecuatoriana (Ecuador) can use its Mirage F.1JAs in the attack role.



Morocco's Mirage F.1CHs have seen strike action against the Polisario guerillas in the Spanish Sahara alongside the force's Mirage F.1EHs. Eighteen of the former and 20 of the latter have been supplied by France.



Specification
Mirage F.1E
Type: single-seat multi-role fighter
Armament: two 30-mm DEFA 553 cannon (with 125 rpg) in front fuselage; wingtip rails for Magic or Sidewinder AAMs; four wing pylons and one centreline pylon for up to 4000 kg (8,818 lb) or ordnance including Martel and AS.30/AS.30L ASMs
Powerplant: one 7200-kg (15,873-lb) thrust SNECMA Atar 9K-50 afterburning turbojet
Performance: maximum speed, clean Mach 2.2 at high altitude; service ceiling 20000 m (65,615 ft); endurance 3 hours 45 minutes
Weights: empty 7400 kg (16,314 lb); maximum take-off 16200 kg (35,714 lb)
Dimensions: span 8.40 m (27 ft 6¾ in); length 15.00 m (49 ft 2½ in); height 4.50 m (14 ft 9 in); wing area 25.00 m² (269.1 sq ft)



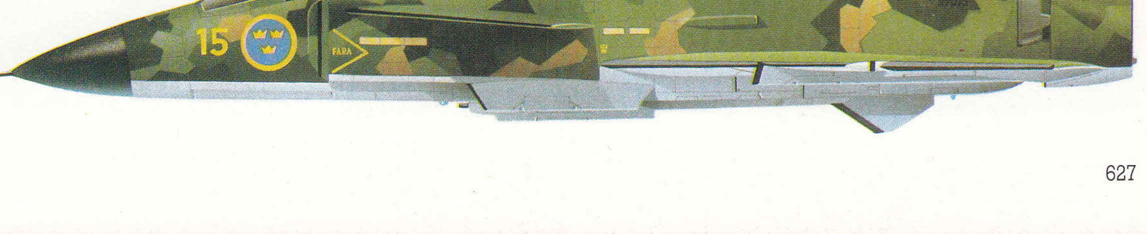
In common with most Mirage F.1 users, Greece flies its aircraft mainly in the interceptor role, but they have secondary attack capabilities. This is one of 39 F.1CGs flying from Tanagra with 114 Pterix (wing).

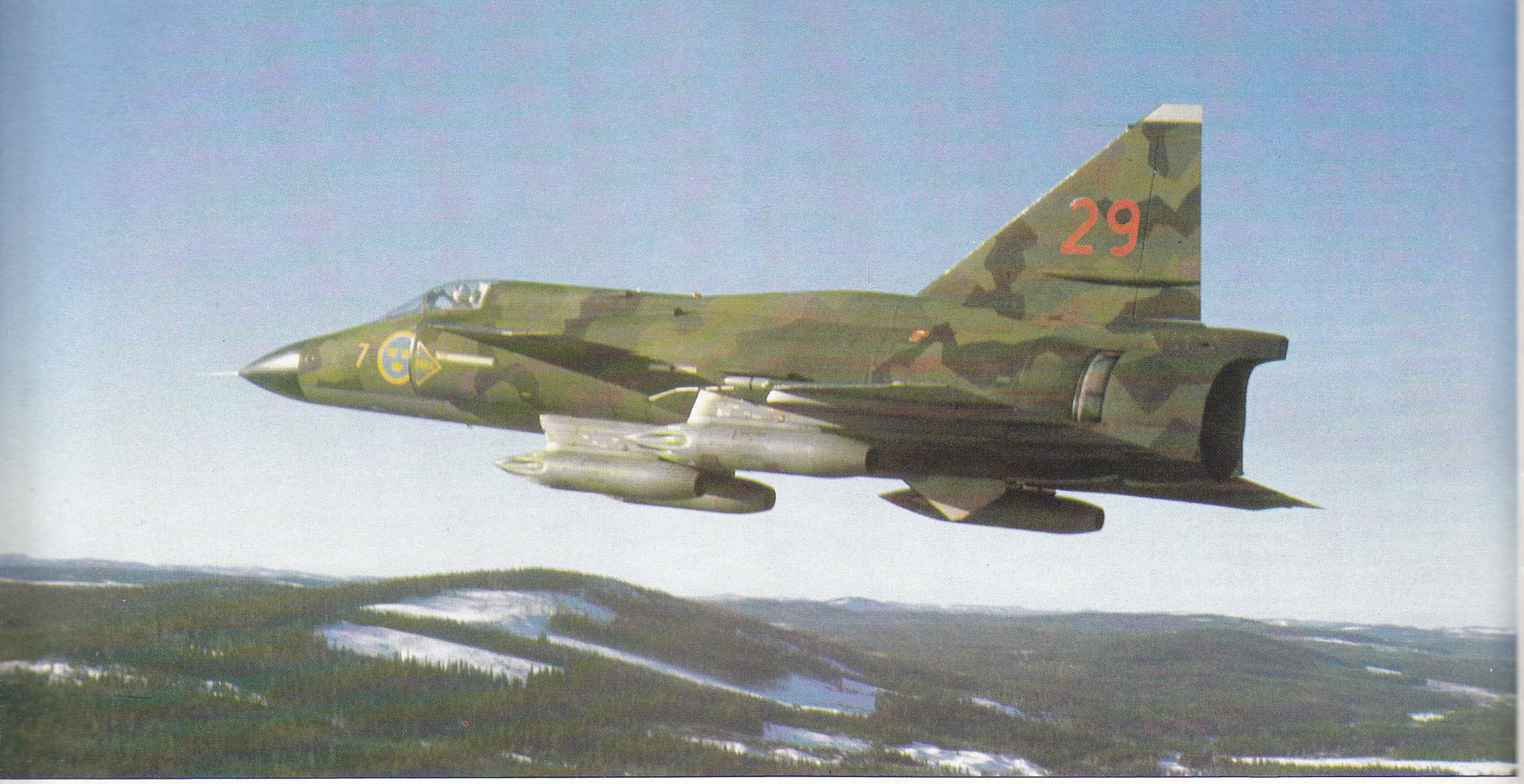
SWEDEN

Saab AJ37 Viggen

Sweden, a country which takes its neutrality seriously, has a long tradition of producing effective fighters to defend its territory. Epitomizing these is the **Saab 37 Viggen** (thunderbolt) multi-role combat aircraft of advanced design, whose canard delta configuration derives from the requirement for STOL performance to permit operation from short roadway dispersal airfields. In addition, it is powered by an economical US-designed JT8D turbofan engine which has a powerful Swedish-produced afterburner, thereby combining the qualities of long range or protracted loiter with swift acceleration when needed. Short-field ability is enhanced by an automatic speed control and a thrust reverser, so that with its numerous aerodynamic aids the Viggen can take off in 400 m (1,310 ft) and land in 500 m (1,640 ft), coming 'over the fence' at a remarkably docile 220 km/h (137 mph) for such a high-performance aircraft. First flown on 8 February 1967, the Viggen entered service four years later in its **AJ37** form, the prefix letter indicating primary attack and secondary interceptor roles. Production of the AJ37 totalled 110 aircraft, but three basically similar models were produced in parallel, conforming to the Swedish practice of producing a single airframe capable of adaptation to specialist roles. Associated models were 26 **SH37** maritime radar-surveillance variants; 26 **SF37** overland photo-reconnaissance aircraft; and 18 **Sk37** two-seat trainers with taller fins. All have secondary attack duties with weaponry similar to that of the AJ37. The more advanced, higher-powered **JA37**, which was issued to squadrons

Due to its exceptional STOL capabilities, the Viggen can operate from stretches of road. This enables it to deploy away from its parent airfield, minimizing the possibilities of being destroyed on the ground. This is an AJ37 from F15 wing at Söderhamn.





Flying from Satenas, F7 wing operates the AJ37 Viggen as a dedicated attack aircraft. The camouflage is one of the most complicated in the world, with four colours applied with precision. Seven hardpoints are available for a wide range of stores.

from 1979 onwards, is optimized for interception yet may also be used for attack. Orders for this variant total 149.

Specification

AJ37 Viggen

Type: single-seat all-weather attack aircraft with secondary interceptor capability

Armament: seven attachment points (four wing and three fuselage) for bombs, rocket pods, 30-mm Aden cannon pods, Rb04, Rb05 and Maverick ASMs, plus (interception mission) Rb24 Sidewinder and Rb28 Falcon AAMs

Powerplant: one 11800 kg (26,014-lb) thrust Volvo Flygmotor RM8A (Pratt & Whitney JT8D-22) afterburning turbofan

Performance: maximum speed Mach 2+ at altitude; maximum speed Mach 1.2 at 100 m (330 ft); climb to 10000 m (32,810 ft) in under 100 seconds; tactical radius, armed 1000+ km (621+ miles) on a hi-lo-hi mission, 500+ km (310+ miles) on a lo-lo-lo mission

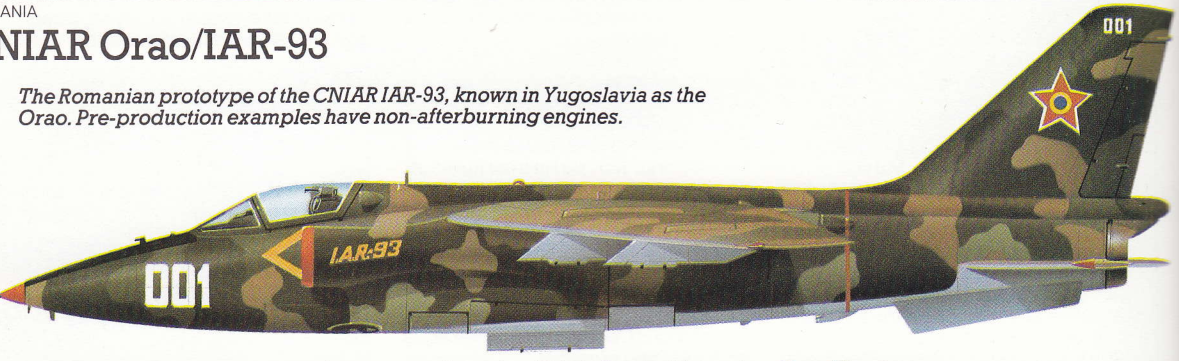
Weights: empty about 11800 kg (26,015 lb); maximum take-off 20500 kg (45,194 lb)

Dimensions: span 10.60 m (34 ft 9¼ in); length 16.30 m (53 ft 5¾ in); height 5.80 m (19 ft 0¼ in); wing area 46.00 m² (495.1 sq ft)

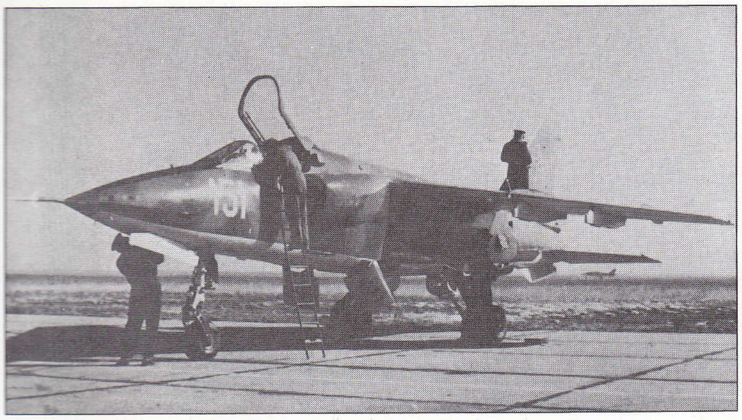
YUGOSLAVIA/ROMANIA

Soko/CNIAR Orao/IAR-93

The Romanian prototype of the CNIAR IAR-93, known in Yugoslavia as the Orao. Pre-production examples have non-afterburning engines.



A unique example of co-operation in military aircraft design by countries on opposite sides of the Iron Curtain, the Orao was made possible by the unusual latitude allowed to Romania by its Soviet ally in the Warsaw Pact, and the Communist persuasion of non-aligned Yugoslavia. Built in the latter country as the **Soko Orao** (eagle) and in Romania as the **CNIAR** (Centrul National al Industriei Aeronautica Române) **IAR-93**, the aircraft was designed by a joint team and developed under a programme known as YuRom, the name indicating the partner countries. Prototypes assembled by Soko and CNIAR made their first flights within minutes of each other on 31 October 1974, and these were followed by a pair of two-seat variants, both of which flew on 29 January 1977. During 1978, deliveries began of a pre-production batch of 15 to each country, after which the initial series model, known in Romania as the **IAR-93A**, entered service. This is fitted with a pair of non-afterburning Viper Mk 632 engines, but after a short run of single- and two-seat aircraft to this standard (20 of them for Romania) manufacture began of the definitive **IAR-93B** which features a licence-built afterburner and structural changes such as integral wing fuel tanks and a honeycomb rudder and tailplane. Romania requires 165 IAR-93Bs, including some two-seat models, with similar operational capability to the main version, for advanced training and weapons instruction. Yugoslav plans are believed to be similar. The Orao/IAR-93 is limited to the close support role by its lack of radar or inertial navigation, but low-level interception is a secondary duty.



A Romanian Orao undergoes maintenance. The two underfuselage dive-brakes are open and the port 23-mm twin-barrel cannon is visible under the air intake.

Specification

IAR-93B

Type: single-seat close-support fighter with two-seat derivative

Armament: two 23-mm GSh-23L twin-barrel cannon (with 200 rpg) in front fuselage; four wing pylons and one centreline pylon carrying five 250-kg (551-lb) bombs or equivalent loads including rocket pods

Powerplant: two 2268-kg (5,000-lb) Rolls-Royce Viper Mk 633-47 afterburning turbojets

Performance: maximum speed 1160 km/h (721 mph) at sea level; service ceiling 12500 m (41,010 ft); initial climb rate 3960 m (12,990 ft) per minute

Weights: empty equipped 5900 kg (13,007 lb); maximum take-off 10097 kg (22,260 lb)

Dimensions: span 9.62 m (31 ft 6¾ in); length, excluding probe 13.96 m (45 ft 9½ in); height 4.45 m (14 ft 7¼ in); wing area 26.00 m² (279.86 sq ft)

UK

British Aerospace Harrier

Evolved from the **Hawker P.1127** vertical take-off technology demonstrator, whose intended supersonic development (the P.1154), was cancelled, the **BAe Harrier** remains the only Western combat aircraft in the world powered by a vectored-thrust engine. Originally regarded as an impractical novelty, it confounded its critics by giving sterling service during the Falklands war of 1982, combining technical reliability with accuracy in attack and resistance to heavy defensive fire, while its naval cousin achieved undisputed air superiority over the islands. Though the P.1127 first flew in September 1960, it was not until exactly nine years later that the RAF's first squadron was formed with **Harrier GR.Mk 1** aircraft, the designation subsequently changing to **Harrier GR.Mk 1A** and then **Harrier GR.Mk 3** as the Pegasus progressed from the 8709-kg (19,200-lb) Mk 101 through Mk 102 to the present Mk 103. The two-seat trainer, with longer fuselage and taller fin, was similarly designated **Harrier T.Mk 2, Harrier T.Mk 2A** and **Harrier T.Mk 4**. Despite power increases, the Harrier is unable to take off vertically with a full weapon load, but can take off from a short length of road or semi-prepared strip in the STOVL (short take-off, vertical landing) mode for tactical concealment. Equipped from the outset with a Ferranti FE541 inertial navigation system with head-up display, the RAF aircraft were fitted from 1976 with a Marconi LRMTS (laser ranger and marked-target seeker) resulting in a much extended profile to the nose. A Marconi ARI 18223 E-J band radar warning receiver was added to the fin and extreme rear fuselage at the same time. The Harrier carries a single oblique camera in the port side of the nose, but may be equipped with a sensor pod beneath the fuselage for more extensive reconnaissance. Following the production of six pre-production aircraft, the RAF received 114 single-seat Harriers and has ordered four more for replacement of Falklands losses. US Marine Corps contracts covered 102 **AV-8A** aircraft (now converted to **AV-8C** standard), and the Spanish navy acquired 11 **VA.1 Matador** aircraft. Two-seat trainer orders cover 23 for the RAF (those not fitted with LRMTS being Harrier **T.Mk 4A** aircraft), eight **TAV-8A** aircraft, two **VAE.1 Matador** aircraft, a Harrier T.Mk 4 and three navalized **Harrier T.Mk 4M** aircraft for the Royal Navy, plus a company demonstrator.

Specification

Harrier GR.Mk 3

Type: single-seat close-support and reconnaissance fighter

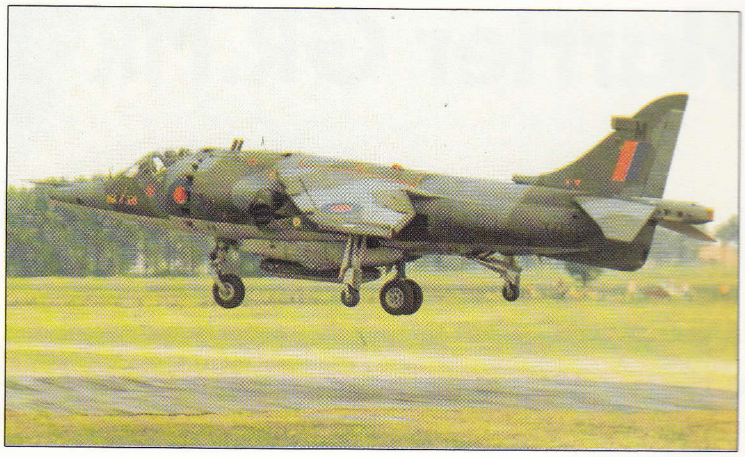
Armament: two 30-mm Aden cannon (with 130 rpg) on fuselage strongpoints; four wing pylons carrying up to 2268 kg (5,000 lb) of ordnance (or 455-litre/100-Imp gal tanks, inboard only), including 454-kg (1,000-lb) free-fall or retarded bombs, 68-mm (2.68-in) SNEB rocket pods, BL755 cluster bombs, AIM-9L Sidewinder AAMs (single round each outer pylon), or optionally, Paveway laser-guided bombs and (Royal Navy aircraft) 51-mm (2-in) rocket pods

Powerplant: one 9752-kg (21,500-lb) thrust Rolls-Royce Pegasus 103 vectored-thrust turbofan

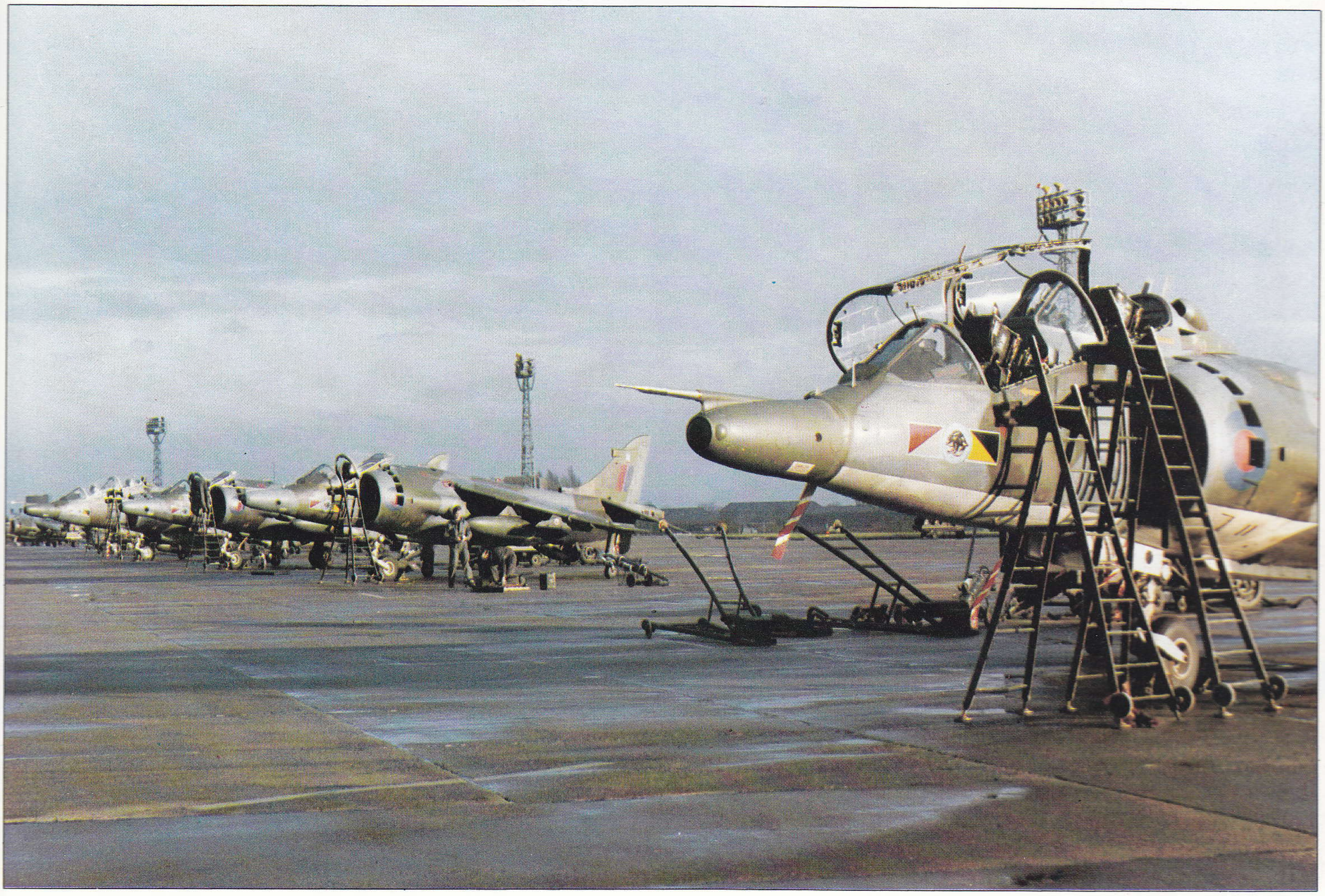
Performance: maximum speed, clean 1159 km/h (720 mph) at 305 m (1,000 ft) or Mach 0.95; tactical radius on a hi-lo-hi mission 418 km (260 miles)

Weights: empty 5425 kg (11,960 lb); maximum for vertical take-off 8165 kg (18,000 lb); maximum for short-take-off 11340+ kg (25,000+ lb)

Dimensions: span 7.09 m (23 ft 3 in); length 14.27 m (46 ft 10 in); height 3.45 m (11 ft 4 in); wing area 18.67 m^2 (201.0 sq ft)

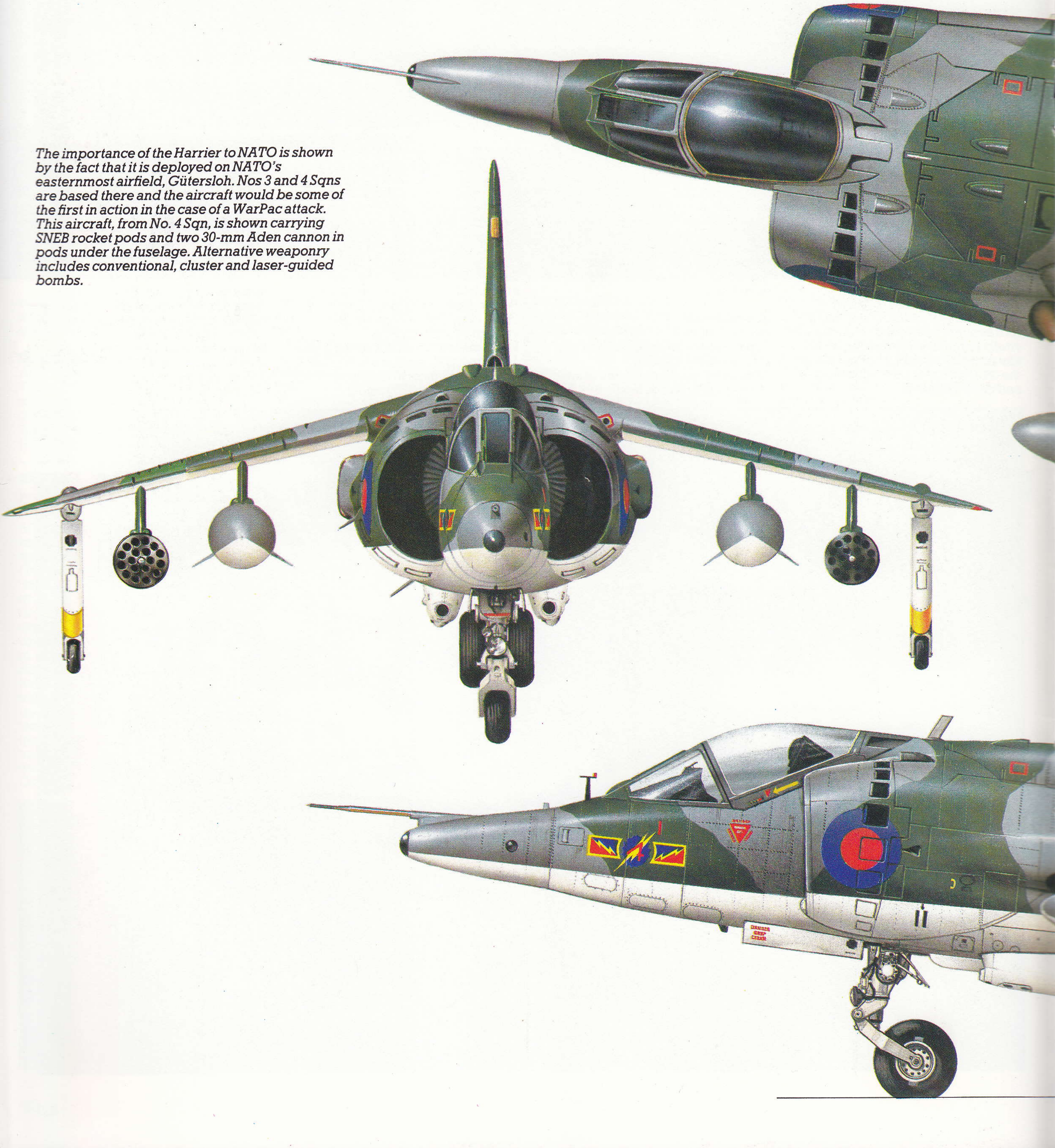


The Harrier gains its remarkable performance from the four swivelling thrust nozzles which can provide both lift for VTOL and forward thrust by rotating through 90°. This aircraft is from No. 4 Sqn, one of the two squadrons maintained in Germany.

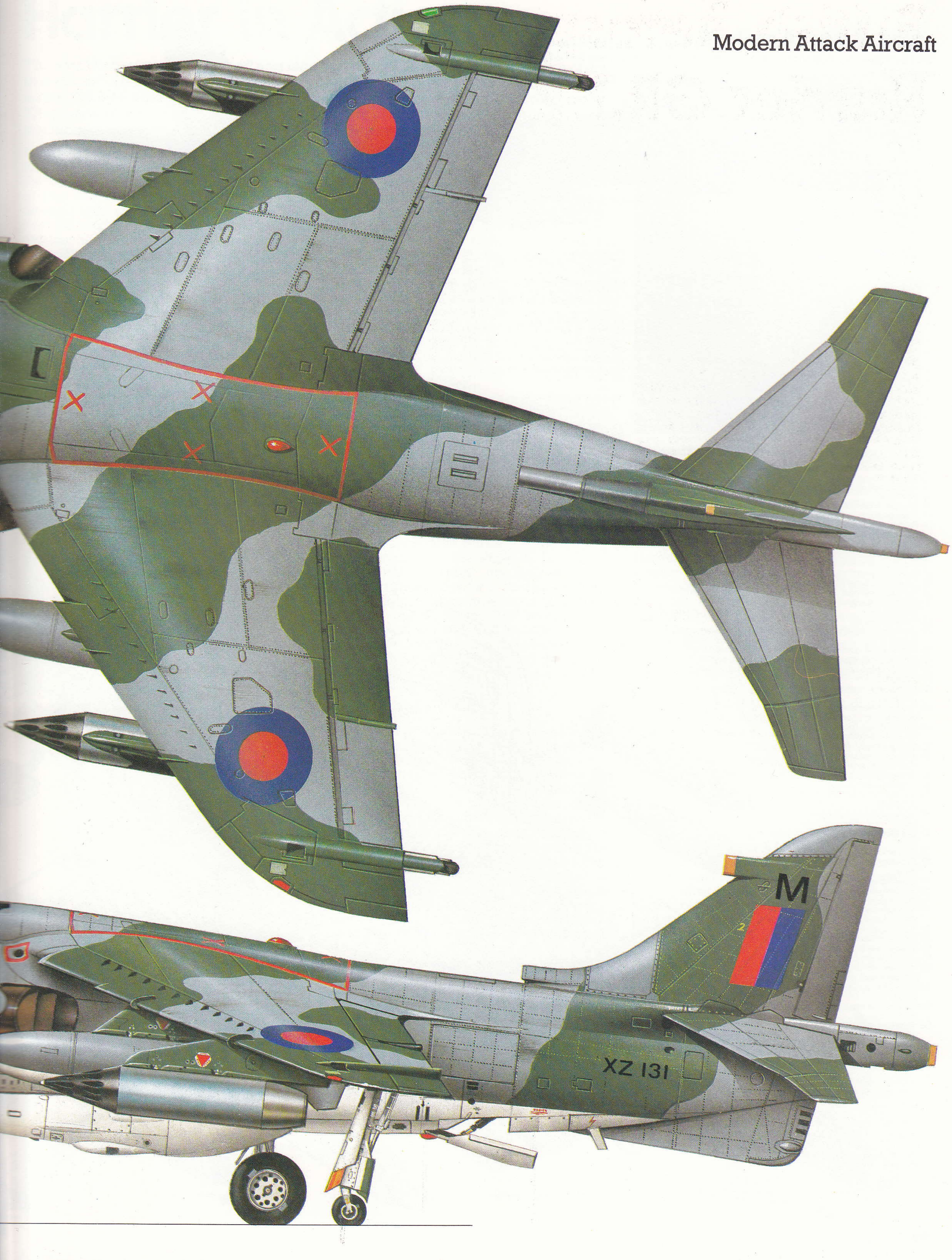


Two T.Mk.4 and two GR.Mk.3 Harriers of No. 233 OCU at Wittering on a summer's morning. Training is vitally important, for the Harrier is like no other aircraft. In times of war, the OCU would become operational and carry weapons.

British Aerospace Harrier GR.Mk 3



The importance of the Harrier to NATO is shown by the fact that it is deployed on NATO's easternmost airfield, Gütersloh. Nos 3 and 4 Sqns are based there and the aircraft would be some of the first in action in the case of a WarPac attack. This aircraft, from No. 4 Sqn, is shown carrying SNEB rocket pods and two 30-mm Aden cannon in pods under the fuselage. Alternative weaponry includes conventional, cluster and laser-guided bombs.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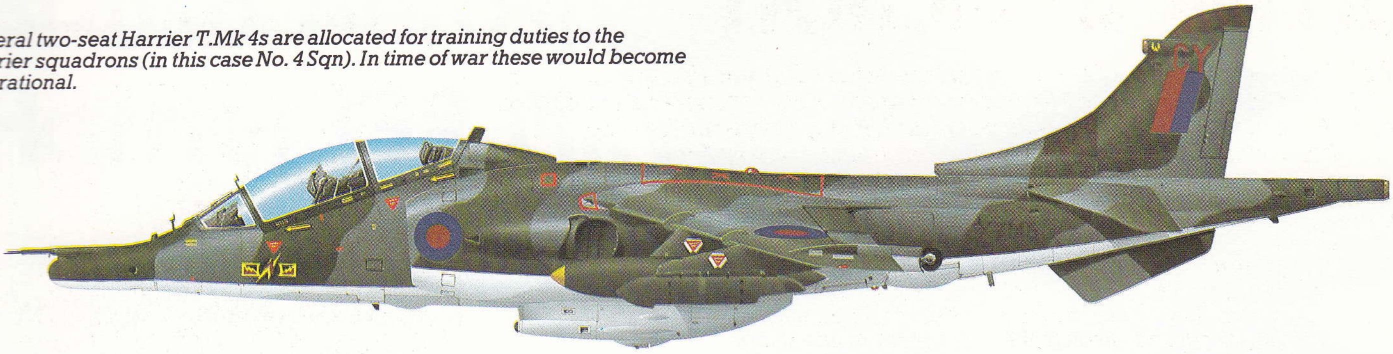
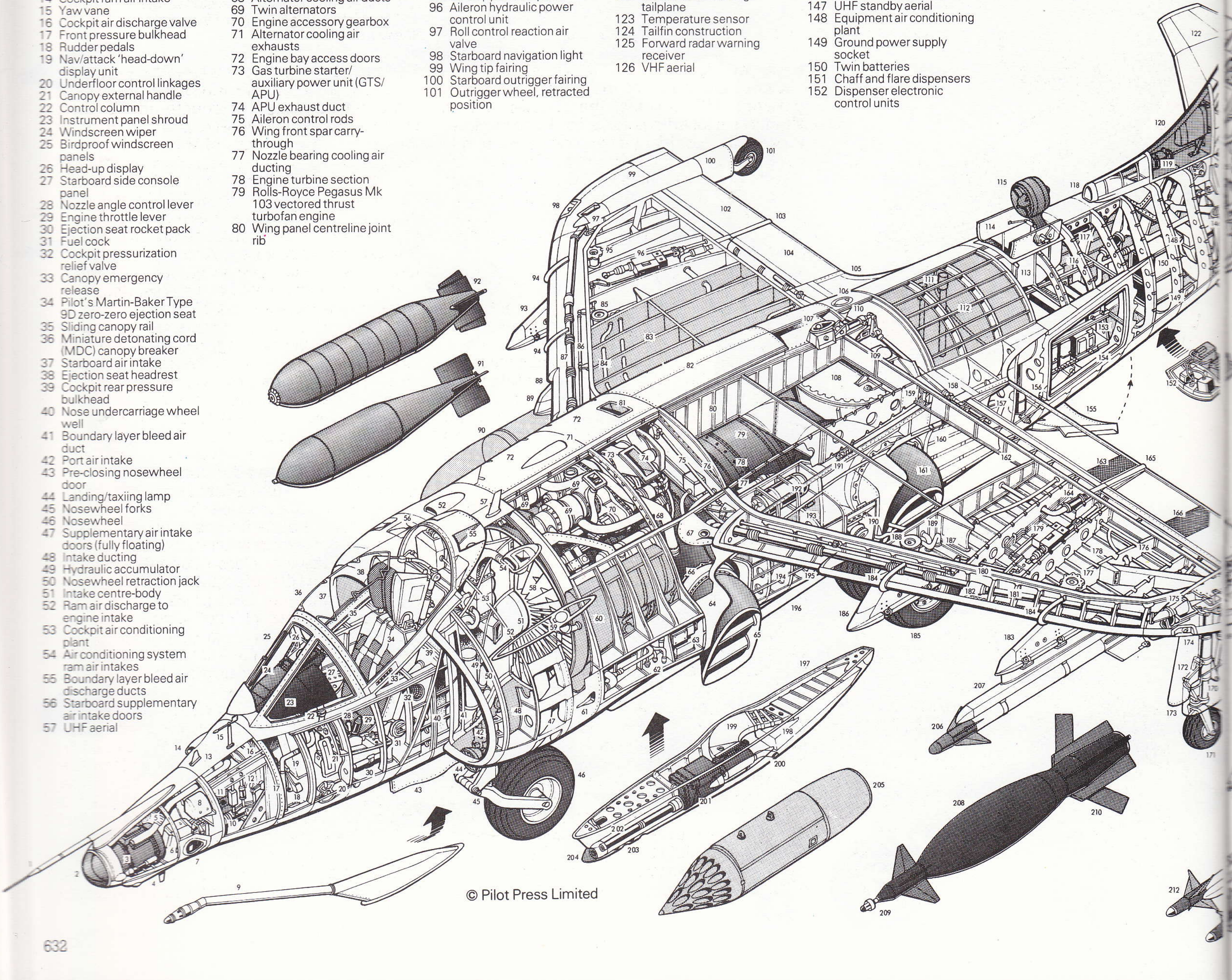
Several two-seat Harrier T.Mk 4s are allocated for training duties to the Harrier squadrons (in this case No. 4 Sqn). In time of war these would become operational.



British Aerospace Harrier GR.Mk 3 cutaway drawing key

1 Pitot tube
2 Laser protective 'eyelids'
3 Ferranti Laser Ranger and Marked Target Seeker (LRMTS)
4 Transponder housing and aerial
5 Cooling air duct
6 Oblique camera
7 Camera port
8 Windshield washer reservoir
9 Detachable inflight-refuelling probe
10 Nose pitch reaction control duct
11 Inertial platform
12 Pitch feel and trim actuator
13 IFF aerial
14 Cockpit ram air intake
15 Yaw vane
16 Cockpit air discharge valve
17 Front pressure bulkhead
18 Rudder pedals
19 Nav/attack 'head-down' display unit
20 Underfloor control linkages
21 Canopy external handle
22 Control column
23 Instrument panel shroud
24 Windscreen wiper
25 Birdproof windscreen panels
26 Head-up display
27 Starboard side console panel
28 Nozzle angle control lever
29 Engine throttle lever
30 Ejection seat rocket pack
31 Fuel cock
32 Cockpit pressurization relief valve
33 Canopy emergency release
34 Pilot's Martin-Baker Type 9D zero-zero ejection seat
35 Sliding canopy rail
36 Miniature detonating cord (MDC) canopy breaker
37 Starboard air intake
38 Ejection seat headrest
39 Cockpit rear pressure bulkhead
40 Nose undercarriage wheel well
41 Boundary layer bleed air duct
42 Port air intake
43 Pre-closing nosewheel door
44 Landing/taxiing lamp
45 Nosewheel forks
46 Nosewheel
47 Supplementary air intake doors (fully floating)
48 Intake ducting
49 Hydraulic accumulator
50 Nosewheel retraction jack
51 Intake centre-body
52 Ram air discharge to engine intake
53 Cockpit air conditioning plant
54 Air conditioning system ram air intakes
55 Boundary layer bleed air discharge ducts
56 Starboard supplementary air intake doors
57 UHF aerial
58 Engine intake compressor face
59 Air refuelling probe mounting and fuel connector
60 Forward fuselage integral fuel tank, port and starboard
61 Engine bay venting air scoop
62 Hydraulic ground connections
63 Engine monitoring and recording equipment
64 Forward nozzle fairing
65 Fan air (cold stream) swivelling nozzle
66 Nozzle bearing
67 Venting air intake
68 Alternator cooling air ducts
69 Twin alternators
70 Engine accessory gearbox
71 Alternator cooling air exhausts
72 Engine bay access doors
73 Gas turbine starter/auxiliary power unit (GTS/APU)
74 APU exhaust duct
75 Aileron control rods
76 Wing front spar carry-through
77 Nozzle bearing cooling air ducting
78 Engine turbine section
79 Rolls-Royce Pegasus Mk 103 vectored thrust turbofan engine
80 Wing panel centreline joint rib
81 APU intake
82 Wing centre-section fairing panels
83 Starboard wing integral fuel tank; total internal fuel capacity 630 Imp gal (2865 litres)
84 Fuel system piping
85 Pylon attachment hardpoint
86 Aileron control rod
87 Reaction control air duct
88 Leading-edge dog-tooth
89 Starboard inner stores pylon
90 190-Imp gal (864 litre) jettisonable combat fuel tank
91 1,000-lb (454-kg) HE bomb
92 BL755 600-lb (272-kg) cluster bomb (CBU)
93 Starboard outer stores pylon
94 Wing fences
95 Outer pylon hardpoint
96 Aileron hydraulic power control unit
97 Roll control reaction air valve
98 Starboard navigation light
99 Wing tip fairing
100 Starboard outrigger fairing
101 Outrigger wheel, retracted position
102 Starboard aileron
103 Fuel jettison pipe
104 Starboard plain flap
105 Trailing-edge root fairing
106 Water-methanol filler cap
107 Anti-collision light
108 Water-methanol injection system tank
109 Fire extinguisher bottle
110 Flap hydraulic jack
111 Fuel contents transmitters
112 Rear fuselage integral fuel tank
113 Ram air turbine housing
114 Turbine doors
115 Emergency ram air turbine (extended position)
116 Rear fuselage frames
117 Ram air turbine jack
118 Cooling air ram air intake
119 HF tuner
120 HF notch aerial
121 Rudder control rod linkages
122 Starboard all-moving tailplane
123 Temperature sensor
124 Tailfin construction
125 Forward radar warning receiver
126 VHF aerial
127 Fin tip aerial fairing
128 Rudder upper hinge
129 Honeycomb rudder construction
130 Rudder trim jack
131 Rudder tab
132 Tail reaction control air ducting
133 Yaw control port
134 Aft radar warning receiver
135 Rear position light
136 Pitch reaction control valve
137 Tailplane honeycomb trailing edge
138 Extended tailplane tip
139 Tailplane construction
140 Tail bumper
141 IFF notch aerial
142 Tailplane sealing plate
143 Fin spar attachment
144 Tailplane centre-section carry-through
145 All-moving tailplane control jack
146 Ram air exhaust duct
147 UHF standby aerial
148 Equipment air conditioning plant
149 Ground power supply socket
150 Twin batteries
151 Chaff and flare dispensers
152 Dispenser electronic control units
153 Radio and electronics equipment racks
154 Electronics bay access door
155 Ventral airbrake
156 Airbrake hydraulic jack
157 Nitrogen pressurizing bottles for hydraulic system
158 Flap drive torque shaft
159 Rear spar/fuselage attachment joint
160 Nozzle blast shield
161 Rear (hot stream) swivelling exhaust nozzle
162 Wing rear spar
163 Port flap honeycomb construction
164 Fuel jettison valve
165 Fuel jettison pipe
166 Aileron honeycomb construction
167 Outrigger wheel fairing
168 Wing tip fairing



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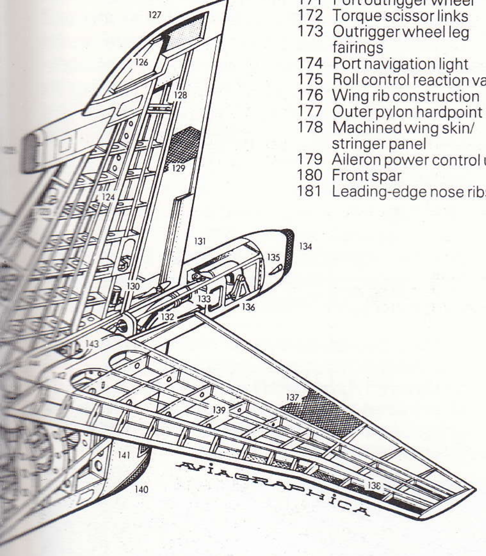
Harrier in Action

The world's first vertical take-off and landing combat aircraft saw its baptism of fire in the South Atlantic conflict. It proved an immediate success (as its naval cousin had already done), able to operate from both ships and hastily prepared landing areas. They were able to deliver highly effective surprise attacks on key Argentine positions.

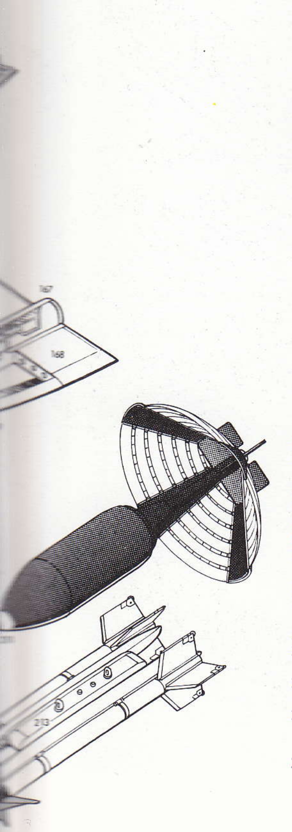
Row upon row of cans and drums, each holding fuel for the Argentine forces occupying the Falkland Islands, lay dispersed by the shores of Fox Bay. The morning of 20 May 1982 dawned cold and damp, low cloud hanging over the nearby high ground, and although the weather improved slightly in the afternoon, the troops felt secure from air attack as they dug in the vital stores. Suddenly, a warning cry rang out as three aircraft appeared from behind a hill and, hugging the ground, bore down on the hapless defenders. Before guns could be manned, the first aircraft was roaring over the fuel dump flat-out, two containers falling from the outer wing strongpoints before it was out over Falkland Sound and away.

The containers (BL755 cluster bombs) broke open in mid-air and a shower of small but highly potent mines rained down on the ranks of stored fuel. A ripple of fire raced over the ground as the bomblets exploded on contact; then larger explosions as the drums began to detonate. Singly, the second and third aircraft carried out similar attacks, adding to the conflagration. As the sound of the last engine died away, a pall of thick, black smoke hung over the scene of devastation, where the fires were still burning. The Harrier GR.Mk 3s of No. 1 Squadron, RAF, had announced their arrival in the South Atlantic war.

169 Hydraulic retraction jack
170 Shock absorber leg strut
171 Port outrigger wheel
172 Torque scissor links
173 Outrigger wheel leg fairings
174 Port navigation light
175 Roll control reaction valve
176 Wing rib construction
177 Outer pylon hardpoint
178 Machined wing skin/stringer panel
179 Aileron power control unit
180 Front spar
181 Leading-edge nose ribs



182 Reaction control air ducting
183 Port outer stores pylon
184 Leading-edge fences
185 Twin mainwheels
186 Port inner stores pylon
187 Fuel and air connections to pylon
188 Inboard pylon hardpoint
189 Port wing fuel tank end rib
190 Pressure refuelling connection
191 Wing bottom skin panel/fuselage attachment joint
192 No. 1 hydraulic system reservoir (No. 2 to starboard)
193 Centre fuselage integral fuel tank, port and starboard
194 Nozzle fairing construction
195 Leading-edge dog-tooth
196 Cushion augmentation strake (fitted in place of gun pod)
197 Cannon pod
198 Ammunition box, 100 rounds
199 Ammunition feed chute
200 Link ejector chute
201 Aden 30-mm revolver-type cannon
202 Cannon barrel
203 Blast suppression ports
204 Frangible nose cap
205 RN 2-in (4.1-cm) rocket pod
206 AIM-9L Sidewinder air-to-air missile
207 Missile launch rail
208 Paveway II (Mk 13/18) laser guided bomb (LGB)
209 Laser seeker head
210 Folding fins, deployed position
211 1,000-lb (454-kg) retarded bomb, deployed condition
212 Twin AIM-9L Sidewinder installation (option for Sea Harrier FRS Mk 1)
213 Missile pylon adaptor



Already, the Sea Harriers of the Royal Navy had undertaken attacks on ground targets, flying their first such sorties on 1 May, but they were desperately needed in their capacity as interceptors and too valuable to risk in operations where they would be flying almost down the barrels of waiting AA guns. Argentine air force pilots had rapidly developed a respect for the Sea Harrier, and soon their companions on the ground would share a similar fear of the small yet aggressive Harrier GR.Mk 3.

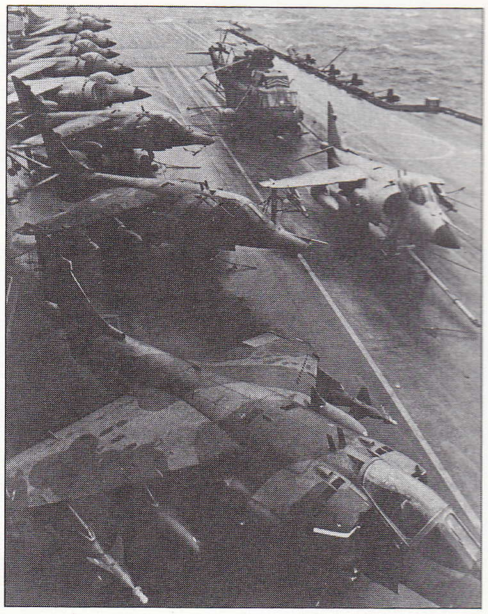
Operating from the deck of the aircraft-carrier HMS *Hermes*, the Harrier was in strange surroundings for a land-based close-support fighter. Many new techniques had to be learnt rapidly by the RAF pilots (not the least of which was taking off from the 'ski-jump' on the bow of the *Hermes*) before their arrival with the British Task Force, and the aircraft, too, had received hasty modification before departure.

New equipment

Outboard pylons were fitted to take the AIM-9L Sidewinder AAM in case additional air-defence fighters were needed, and Royal Navy 51-mm (2-in) rocket pods substituted for the usual SNEBs as the latter are unsafe in the high electromagnetic environment aboard ship. A transponder was fitted in the nose for identification by friendly radars, and later an AN/ALE-40 chaff/flare dispenser was added immediately behind the belly airbrake to confuse defensive weapons. For further effectiveness in this area, the Tornado's Sky Shadow ECM equipment, repackaged in an under-fuselage cannon pod, entered service with the new name of Blue Eric, whilst one aircraft received modifications to allow it to fire Shrike anti-radar missiles, although hostilities ended before these could be used.

To overcome the problem of aligning the FE541 inertial navigation system on a rolling and pitching carrier deck, elements of the Ferranti FIN 1064 INS (produced as airborne equipment for updating the Jaguar) were mounted on a wheeled trolley to be plugged into the Harrier before flight, this feature unfortunately proving less valuable than had been hoped. With this plethora of modifications, almost all produced from scratch in a remarkably short time by specialists from the RAF and industry, the Harrier GR.Mk 3 went to war.

The successful attack against Fox Bay had been merely a curtain-raiser to the main action of the following day: the landing of troops at San Carlos. Early in the morning of 22 May, a pair of Harriers took off from HMS *Hermes* to hinder Argentine attempts at counterattack, their target being a group of helicopters reported on the ground in the vicinity of Mount Kent. Dawn was just breaking as a Boeing Vertol Chinook, two Aérospatiale Pumas and a Bell Iroquois (Huey) were spotted in the half-light, and within moments the first three were burning fiercely as the result of 30-mm Aden cannon fire. Both Harriers returned safely, though one had collected three bullet holes (the first of many).

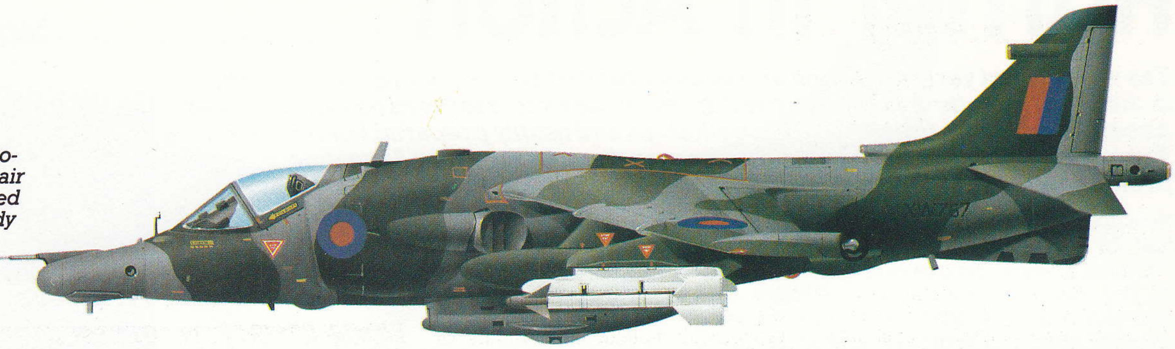


RAF Harriers operated many of their strike missions from the deck of HMS* Hermes*. This line-up includes aircraft carrying Paveway laser-guided bombs (nearest aircraft) and conventional HE bombs. The Sea Harriers flew top cover for these missions.

Revenge was granted to the defenders later in the day when a solitary Harrier was sent to Port Howard to attack suspected Argentine positions. Seeing nothing, the pilot received instructions to make a photographic run with his single port-facing camera, even though a second pass over an alerted enemy is a risky business. Thus it proved to be, the pilot enjoying a lucky escape when the aircraft was hit, probably by 20-mm AA fire.

With British troops safely ashore, moves continued to limit the defenders' ability to counterattack. Most feared were the FMA Pucarás, which could operate from small airfields, and so during the next few days, No. 1 Squadron visited the strips at Goose Bay and Dunnose Head as well as the principal base at Port Stanley. It was just after dawn on 24 May that four Harriers and a pair of Sea Harriers launched their strike on Stanley airport, the latter 'lofting' air-burst bombs from outside the range of the AA defences to occupy the attention of those on the ground.

This had the desired effect, and two Harriers streaked in from the opposite direction, dropping three parachute-retarded 454-kg (1,000-lb) bombs from ultra-low level before the Argentines realized what was happening. The final pair were less fortunate and had the full fury of the guns turned on them. An added hazard, resulting from a minute timing discrepancy, was having to fly through the debris thrown up by the preceding aircraft's bombs, for instead of 30 seconds' separation between



During the Falklands campaign, several No. 1 Sqn aircraft were modified to carry Sidewinder air-to-air missiles for duty in the combat air patrol (CAP) role. These augmented the Royal Navy Sea Harriers already configured in this role.

the two waves, there was only 20. Minor damage was suffered from small arms during the attack, but all aircraft returned safely. Many similar operations were undertaken until the closing days of the war.

Raids during the first week were mounted out of the area of British troop concentrations, but with the first major land battle at Goose Green, the Harrier was given the opportunity to demonstrate its prowess in the close-support role. Operations began with the loss of one of a pair of aircraft on 27 May, although only after both had located a well-camouflaged target and given it a hammering with cluster-bombs and 30-mm cannon. Again, the pilot was saved. Other urgent business occupied the force during the following day, and when the weather closed in, it seemed that no further sorties would be flown.

Though they did not realize it at the time, the British troops attacking Goose Green were outnumbered two to one by a force well equipped with weapons and ammunition and, not unnaturally, their advance was slowing. Responding to an urgent call for help, three Harriers took off from the *Hermes*' deck in almost gale-force winds. Arriving at Goose Green, they were directed by a forward air controller on the ground to a 35-mm gun battery which was giving the troops a hard time, and running in at a mere 15-30 m (50-100 ft) through the surrounding smoke of battle the Harriers caught the Argentines unawares.

Too close for comfort

Two Harriers scattered cluster-bombs and the third followed up with RN 51-mm (2-in) rockets. Though some of the British soldiers regarded the operation as a rather 'too-close support' for comfort, all were given fresh confidence by the display of precision, while a marked deterioration was immediately noticed in Argentine morale. By the following morning, the vastly superior force had capitulated. Despite the propaganda and disinformation coming from Buenos Aires, the defenders at Port Stanley knew what had happened and were acutely conscious of the fact that they were next.

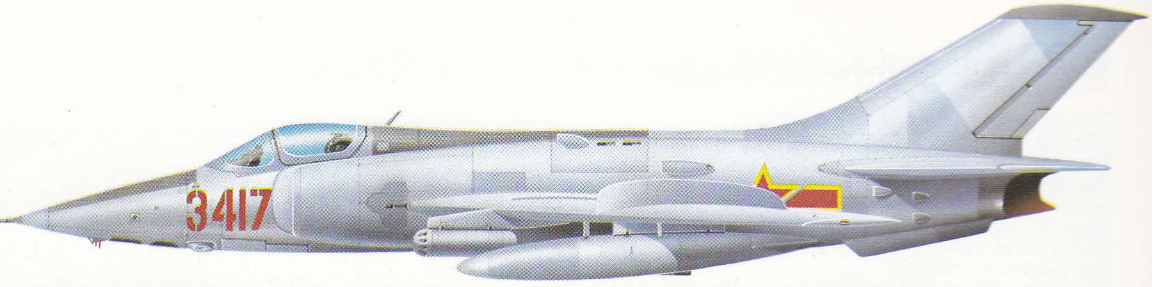
Harriers continued to assist the troops as they marched over rough terrain towards Stanley. A further two were lost without casualties, including one which crashed on the aluminium matting strip laid at San Carlos as a forward base. By 13 June, British forces had captured the high ground to the west of Stanley and were in a position to designate targets by laser. Two successful drops of laser-guided bombs were made on that day, but shortly after noon on 14 June a repeat operation was called off, even as the Harrier was moving into position, when white flags began to appear. The fighting was over.

A total of 126 operational sorties was flown by the 10 RAF Harriers based on the *Hermes*, four of the aircraft arriving towards the end of the conflict as attrition replacements. Flying from an aircraft-carrier (a class of vessel which some pilots had not even seen before) the aircraft took modifications and new equipment in its stride and stood up well to the severe punishment inflicted by guns of all calibres during its ultra-low-level operations. Of three aircraft lost to enemy action, not one was destroyed as the result of damage to engine nozzles or other fitments peculiar to VTOL. Had they been conventional aircraft, losses would still have occurred, but this fact should not be allowed to obscure the vital point that had the UK possessed only conventional aircraft, it might have been the Falkland Islands which were lost.

Several No. 1 Squadron aircraft made their way to the South Atlantic by way of refuelled flights, staging through Ascension Island. These three aircraft are seen at Wideawake airfield. Aircraft in the background are Victor tankers from Nos 55 and 57 Sqns and a USAF StarLifter.

CHINA

Nanchang Q-5



Nanchang Q-5 of the Chinese air force. The Chinese hope to import Western avionics to improve the Q-5's capabilities.

Known in the West as the **Nanchang A-5 'Fantan-A'** and to the People's Liberation Army Air Force as the **Qiangjiji 5** (Attack Aircraft Type 5), the Q-5 was revealed in limited detail only during 1980 although conceived about a decade before as China's first 'almost indigenous' jet fighter-bomber and limited-capability strike aircraft. Detailed examination justifies the qualification, for the Q-5 (particularly its wing) is based on the Mikoyan-Gurevich MiG-19, already built in the People's Republic under the designation Shenyang J-6. Slightly longer than its ancestor, the Q-5 differs considerably in profile by reasons of a 'solid' nose and cheek air inlets made necessary by transfer of some avionics from the centre fuselage to make way for an internal weapons bay (now used for additional fuel), although the MiG's four wing strongpoints and root-mounted cannon are retained for close-support work. Powered by the same Soviet-designed, Chinese-built engines as the J-6, this considerably modified variant has a taller fin and a narrower centre fuselage, the latter an aerodynamic improvement conforming to area-rule. A camera mounted on the starboard side of the nose is for gunnery recording only. The revised nose shape has led to speculation that a radar-equipped version is (or was) planned, but no evidence has emerged to support this suggestion, even though such equipment would improve capabilities as a tactical nuclear bomber, in the apparent absence of an inertial navigation system. Interceptor Q-5s are reported to be in operation with the People's Navy, any differences in equipment being unknown. The Q-5 remains in production at the Nanchang State Aircraft Factory in Jiangxi Province, where several hundred have been built, including 40 or more delivered to Pakistan in 1982-3. Pakistan requires an eventual total of some 150 of this type.

Specification

Nanchang Q-5

Type: single-seat ground-attack aircraft with interceptor capability

Armament: two 23-mm Type 23-2 cannon (with 100 rpg) in wing roots; four wing and four fuselage pylons carrying (normally) 1000 kg (2,205 lb) or (maximum) 2000 kg (4,409 lb) of ordnance, including AAMs, or a tactical nuclear weapon

Powerplant: two 3250-kg (7,165-lb) thrust Shenyang Wopen-6 (Tumansky R-9BF-811) afterburning turbojets

Performance: maximum speed 1190 km/h (739 mph) or Mach 1.12 at 11000 m (36,090 ft) and 1210 km/h (752 mph) at sea level; service ceiling 16000 m (52,495 ft); combat radius with maximum load 400 km (249 miles) on a lo-lo-lo mission or 600 km (373 miles) on a hi-lo-hi mission

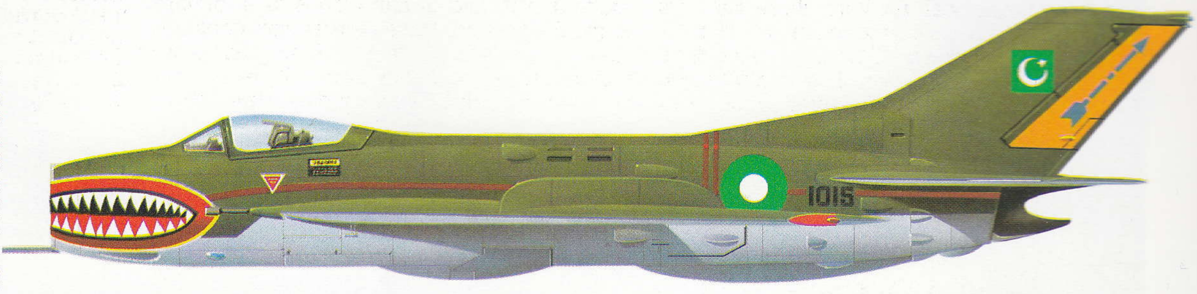
Weights: empty 6494 kg (14,317 lb); maximum take-off 12000 kg (26,455 lb)

Dimensions: span 9.70 m (31 ft 10 in); length 16.73 m (54 ft 10½ in); height 4.51 m (14 ft 9½ in)

Chinese Q-5 pilots pose for the camera with model aircraft simulating combat manoeuvres. The Q-5 is China's most potent attack aircraft.

CHINA

Shenyang J-6



A Pakistan air force J-6 equipped with reconnaissance pack under the fuselage, and two guns only.

Phased out of production in the Soviet Union during the late 1950s, the Mikoyan-Gurevich MiG-19 continues to be built in China under a licence agreement of January 1958. The **J-6** (Jianjiji 6, or Fighter Aircraft Type 6) is normally credited to the Shenyang production facility, although a second assembly line is located at Tianjin. First of the Chinese production models was the J-6 equivalent of the MiG-19S/SF day fighter, this giving way to the **J-6A**/MiG-19PF limited all-weather interceptor and the later **J-6B**/MiG-19PM, the latter augmenting gun and rocket armament by AA-1 'Alkali' AAMs. An improved MiG-19SF, known as the **J-6C** and identified by a brake parachute housing at the base of the fin, is currently in production, as is the **J-6Xin** ('New J-6') which features a sharply-pointed radome in the engine air intake for a Chinese-developed airborne gun-ranging radar. The **JZ-6** (Jianjiji Zhenchaji 6) is a MiG-19R reconnissance version equivalent with the forward fuselage cannon replaced by a camera array. Despite limited Soviet production of a MiG-19UTI, Chinese requirements for a dual-control trainer were met by a local redesign to produce the **JJ-6** (Jianjiji Jiaolianji 6), with its 0.84 m (2 ft 9 in) fuselage extension. Several thousand J-6s have been built for the Chinese army and navy air forces since 1961, whilst export variants (known as the **F-6** and trainer **FT-6**) serve in Albania, Bangladesh, Egypt, Iraq, Pakistan, Tanzania and Vietnam as interceptors and close-support aircraft. Despite its age and short range, the J-6 is well liked by its pilots as a manoeuvrable fighter and stable weapons platform, Pakistan's aircraft having been improved by the addition of a third (underfuselage) fuel tank, US-designed AIM-9B/J Sidewinder AAMs and Martin-Baker PKD Mk 10 automatic zero-zero ejection seats.

Specification

Shenyang/Tianjin J-6C

Type: single-seat close-support fighter and day interceptor

Armament: three internal 30-mm NR-30 cannon (one on starboard side of nose, two in wing roots); wing pylons for two 250-kg (551-lb) bombs or four rocket packs, plus fuel tanks

Powerplant: two 3250-kg (7,165-lb) Shenyang Wopen-6 (Tumansky R-9BF-811) afterburning turbojets

Performance: maximum speed, clean 1540 km/h (957 mph) or Mach 1.45 at 11000 m (36,090 ft); maximum speed 1340 km/h (833 mph) or Mach 1.09 at low level; service ceiling 17900 m (58,725 ft)

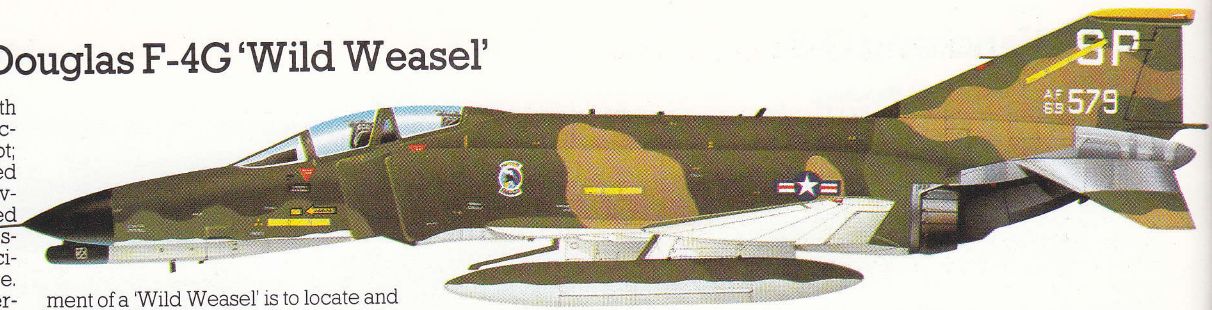
Weights: empty 5760 kg (12,698 lb); normal take-off, clean 7545 kg (16,634 lb); maximum take-off with external stores about 10000 kg (22,046 lb)

Dimensions: span 9.20 m (30 ft 2¼ in); length, excluding probe 12.60 m (41 ft 4 in); height 3.88 m (12 ft 8¾ in); wing area 25.00 m^2 (269 sq ft)

The Shenyang J-6 was a direct Chinese copy of the MiG-19, but later versions have local improvements such as AI radar and extra cannon.

USA

McDonnell Douglas F-4G 'Wild Weasel'



McDonnell Douglas F-4G 'Wild Weasel' Phantom II of the 81st TFS, 52nd TFW, based at Spangdahlem in West Germany.

During its bombing attacks on North Vietnam, the USAF proved the effectiveness of the 'Wild Weasel' concept; that is the use of specially-equipped aircraft flying with, or slightly in advance of, the main attack and tasked with destruction or suppression of hostile radars, particularly those associated with SAM and AA gun guidance. Republic F-105G Thunderchiefs performed well in this role in the early 1970s and 35 F-4C Phantoms were similarly converted in 1968-9, but when the specification for an Advanced 'Wild Weasel' aircraft was drawn up in 1975 the F-4E variant of the Phantom was selected as the basis for modification. Already established as one of the world's most effective interceptor and fighter-bomber aircraft, the Phantom took to the mission with ease, becoming the **McDonnell Douglas F-4G** in the process. First requirement of a 'Wild Weasel' is to locate and classify enemy radars. This is undertaken by a McDonnell Douglas AN/APR-38 radar homing and warning system (RHAWS), the principal external features of which are a receiver and computer pod beneath the nose (replacing the Vulcan rotary cannon) and 56 antennae in a small fintip pod, on the fin sides, upper fuselage and other locations. Three cathode-ray tube displays in the rear cockpit (backed by digital readouts, aural warning system and indicator lights) provide the electronic warfare officer with a detailed picture of the tactical situation and automatically allocate attack priorities to the 15 most pressing threats in order of the danger which they represent. Weapons delivery is also aided by computer, allowing the F-4G to attack its target 'blind' with bombs, anti-radiation missiles and the latest AGM-65D Maverick which has infra-red TV-type guidance. There were 116 conversions to F-4G, these aircraft entering service in 1978 and including 24 based at Spangdahlem, West Germany, with the 81rst RFS/52nd TFW for operations on the NATO Central Front.

Specification
F-4G 'Wild Weasel' Phantom

Type: two-seat defence-suppression aircraft

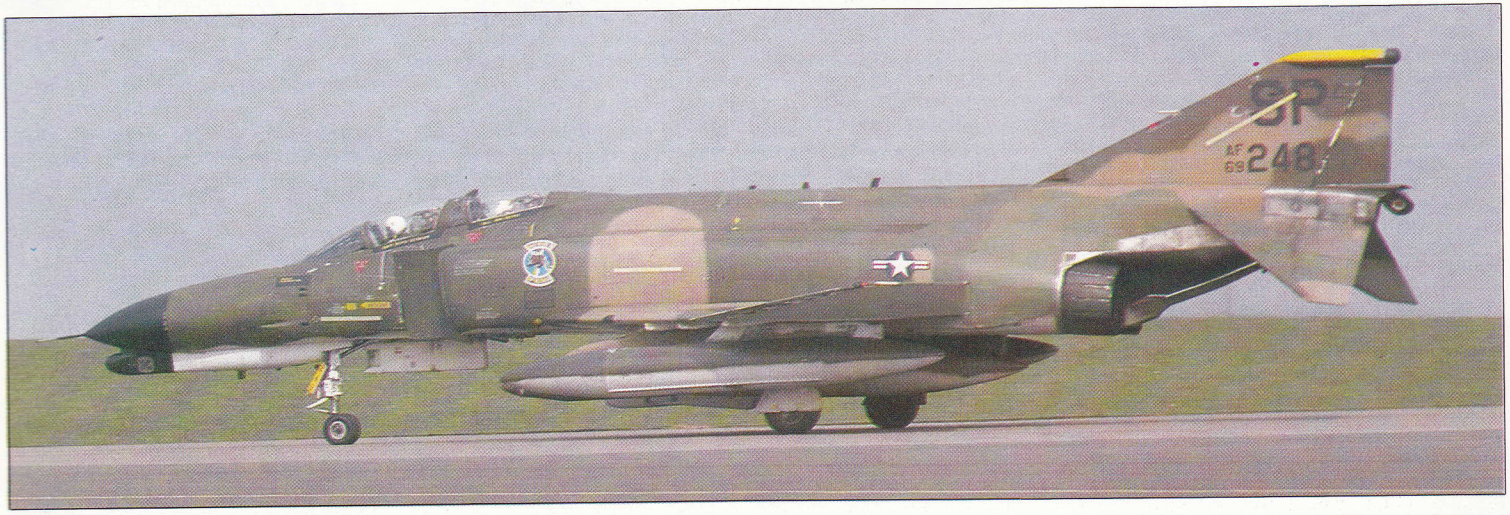
Armament: up to 7258 kg (16,000 lb) of ordnance on seven external mountings, including AGM-45 Shrike, AGM-78 Standard and AGM-88 HARM ARMs and AGM-65 Maverick ASMs: up to four AIM-7F Sparrow and four AIM-9L Sidewinder AAMs for self-defence

Powerplant: two 8119-kg (17,900-lb) thrust General Electric J79-GE-17A afterburning turbojets

Performance: maximum speed with external stores Mach 2+; initial climb rate at maximum take-off weight 2003 m (6,570 ft per minute); service ceiling 16580 m (54,400 ft); combat radius 1145 km (712 miles)

Weights: empty 13757 kg (30,328 lb); maximum take-off 28030 kg (61,795 lb)

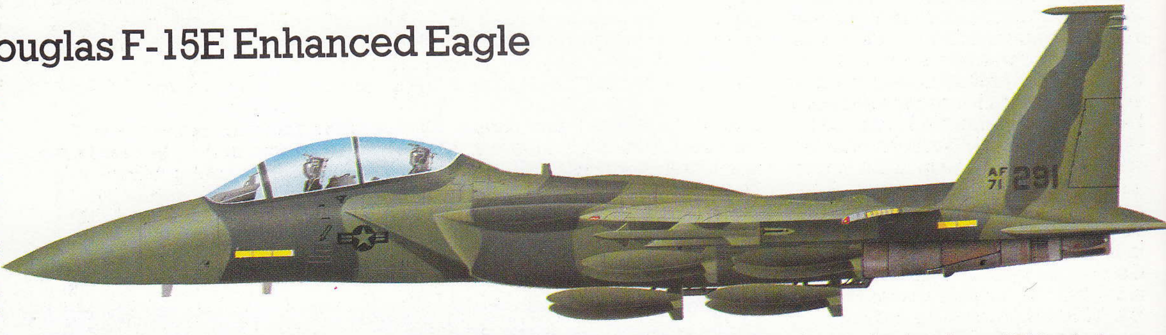
Dimensions: span 11.77 m (38 ft 7½ in); length 19.20 m (63 ft 0 in); height 5.02 m (16 ft 5½ in); wing area 49.2 m^2 (530 sq ft)



Also based at Spangdahlem with the 81st TFS is this F-4G, identified by the antennae pod on the top of the fin and the receiver and computer pod replacing the gun under the nose. Its role is that of radar suppression, and it uses radar-homing missiles to destroy its targets.

USA

McDonnell Douglas F-15E Enhanced Eagle



McDonnell Douglas F-15E Enhanced Eagle carrying bombs and Sidewinders whilst on test for the USAF.

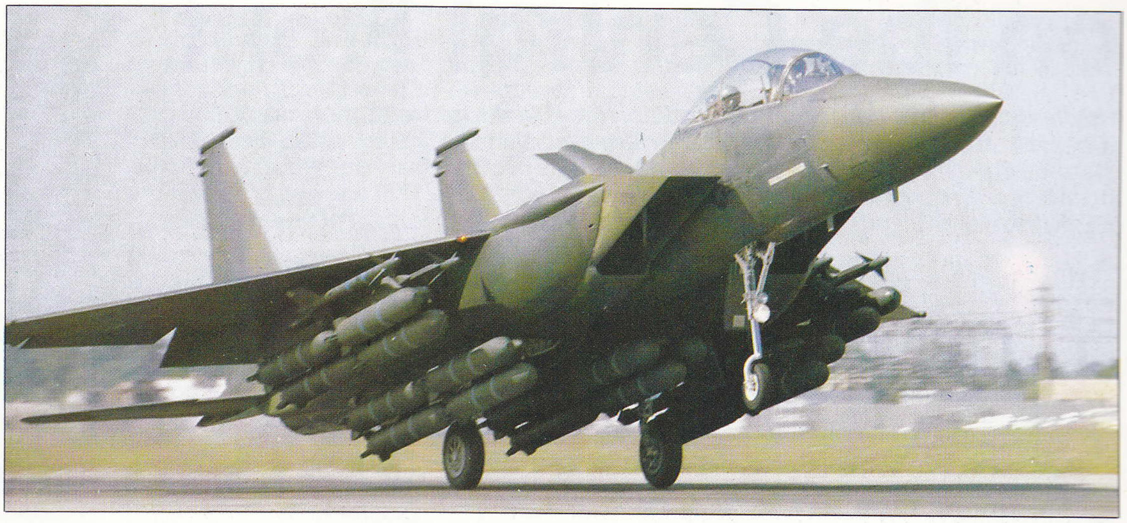
Renowned as an extremely capable interceptor, the F-15 Eagle was modified in 1980 to perform in the all-weather interdictor role whilst still retaining the ability to operate as an air superiority aircraft. This private venture, first known as the **Strike Eagle**, was redesignated **McDonnell Douglas F-15E Enhanced Eagle** when the USAF expressed interest in the concept and conducted an evaluation between November 1982 and April 1983. Together with the delta-winged General Dynamics F-16E, the Enhanced Eagle was competing for selection in the USAF's Derivative Fighter Program as a supplement and eventual replacement for the General Dynamics F-111. Funding shortages have delayed a decision, but the intention is that 400 of the planned production of the chosen type will be built instead with improved air-to-ground weapon-delivery systems and navigation aids. McDonnell Douglas has moved in two directions to enhance the Eagle, concentrating on avionics and weapon-carrying ability. The rear cockpit of the prototype (a converted F-15B trainer) has been fitted with four multi-purpose cathode ray tubes (CRTs) for information display to the systems operator and three more CRTs are to be installed for the pilot in production versions. Beneath the nose-cone, high resolution radar provides long-range ground-mapping of remarkable clarity, whilst forward-looking infra-red (FLIR) gives close-range images of similar quality. In combination, these systems allow rapid target identification in all weathers and ensure accurate weapon delivery. Ordnance carriage has been improved by addition of bomb attachment points on the 'conformal' wing-root fuel and sensor packs, resulting in less drag and freeing wing pylons for additional fuel tanks. Called Tangential Carriage, the modification extends the Eagle's endurance by 40 per cent in some cases. During proving trials, the F-15E demonstrated an ability to take off at a weight of 34020 kg (75,000 lb), some 3175 kg (7,000 lb) above the present maximum.

Specification
F-15E Enhanced Eagle

Type: two-seat multi-role fighter

Armament: one M61A1 Vulcan 20-mm gun (with 940 rounds); up to 10866 kg (24,000 lb) of ordnance on three airframe and/or six fuel-pack attachment points; four AIM-9 Sidewinder and four AIM-7 Sparrow

AAMs
Powerplant: two 10855-kg (23,930-lb) thrust Pratt & Whitney F100-PW-100 afterburning turbofans
Performance: maximum speed Mach 2.5+ at altitude; maximum speed 1481 km/h (920 mph) at sea level; ceiling 20000 m (65,610 ft); endurance 5 hours 15 minutes with conformal tanks
Weights: not released
Dimensions: span 13.05 m (42 ft 9¾ in); length 19.43 m (63 ft 9 in); height 5.63 m (18 ft 5½ in); wing area 56.5 m² (608 sq ft)

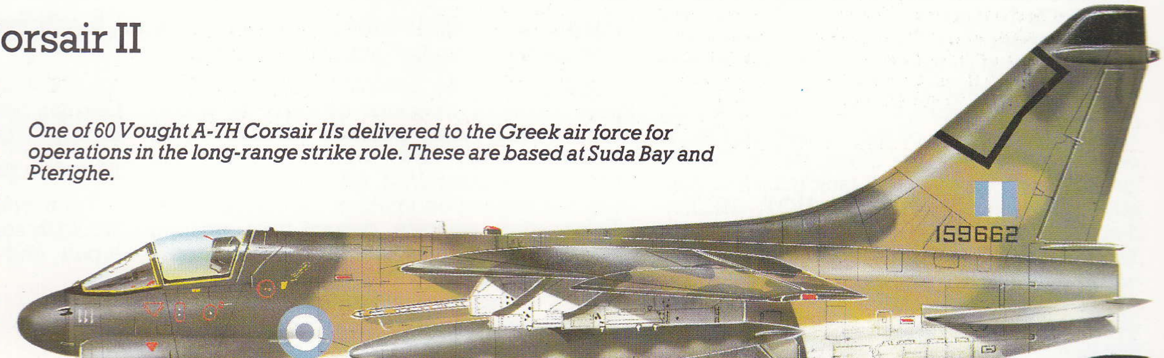


Up to 10866-kg (24,000-lb) of ordnance can be carried by the F-15E. This view shows the 'conformal' wing root fuel tanks and the position of the bomb load. Four Sidewinder AAMs are still carried to augment the gun in self-defence.

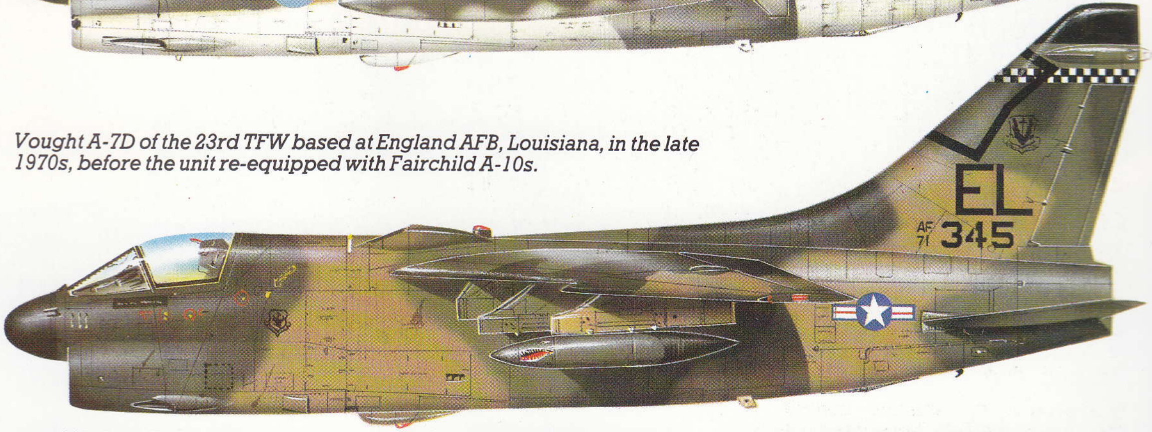
USA

Vought A-7 Corsair II

Produced to a US Navy specification for a carrier-based light attack aircraft, the **Vought Corsair II** was based on the earlier F-8 Crusader interceptor and first flew on 27 September 1965. Required to operate with a larger load of conventional ordnance than the standard naval fighter-bomber of the day the Douglas A-4 Skyhawk, it enjoyed a rapid development period, and by December 1967 was in operational service over Vietnam. Three naval Corsair variants were produced before the USAF commissioned a new model, designated **A-7D**. This was an extensively improved variant with a far more capable nav/attack system, as part of a completely revised avionics fit, and a licence-built Rolls-Royce Spey turbofan providing more power than the Pratt & Whitney TF30 installed in earlier aircraft. Such were the changes that the A-7D had only 25 per cent commonality with the original **A-7A**. Production of the A-7D totalled 459 between 1968 and 1976, the survivors currently operating with 13 Air National Guard (ANG) units, some aircraft having seen service in Vietnam during 1972, flying from Thailand. Deliveries of a combat-capable trainer, the **A-7K**, involved 32 aircraft (31 new and a converted A-7D which acted as prototype) between 1980 and 1983, one being issued to each ANG squadron and the rest to a training group. Land-based export versions comprised 60 **A-7H** aircraft for Greece, a version similar to the naval **A-7E**, itself an A-7D development; six (five new) **TA-7H** trainers for Greece; and 44 **A-7P** plus six **TA-7P** aircraft for Portugal. The latter variants are TF30-engined A-7As rebuilt with more capable A-7E avionics.



One of 60 Vought A-7H Corsair IIs delivered to the Greek air force for operations in the long-range strike role. These are based at Suda Bay and Pterighe.



Vought A-7D of the 23rd TFW based at England AFB, Louisiana, in the late 1970s, before the unit re-equipped with Fairchild A-10s.

Specification

A-7D Corsair II
Type: single-seat close-support and interdictor aircraft
Armament: one internal M61A1 20-mm rotary cannon (with 1,000 rounds); six underwing and two fuselage pylons for over 6804 kg (15,000 lb) of stores, including AIM-9 Sidewinder AAMs on fuselage attachments
Powerplant: one 6804-kg (15,000-lb) thrust Allison TF41-A-2 (Rolls-Royce Spey) turbofan
Performance: maximum speed 1110 km/h (690 mph) at sea level, or 1040 km/h (646 mph) at 1525 m (5,000 ft) with 12 227-kg (500-lb) bombs; ferry range 3670 km (2,280 miles) on internal fuel
Weights: empty 8676 kg (19,127 lb); maximum take-off 19051 kg (42,000 lb)
Dimensions: span 11.80 m (38 ft 9 in); length 14.06 m (46 ft 1½ in); height 4.90 m (16 ft 0¾ in); wing area 34.83 m² (375 sq ft)

Now relegated to ANG units in USAF service, the A-7 set new standards of bombing accuracy when it appeared in 1967. This A-7D from Davis-Monthan AFB fires rockets at a ground target.

US Anti-tank Operations on the Central Front

Hopelessly outnumbered by Warsaw Pact forces in the tank equation, the NATO allies rely on skill and technology to redress the balance. Highly trained aircrew and state-of-the-art aircraft, electronics and weapons produce very impressive displays of anti-tank firepower, but they are themselves vulnerable. Will enough of them survive WarPac's anti-aircraft weapons to stop an endless torrent of enemy tanks?

There are some 25,000 main battle tanks stationed in Central Europe, of which 18,000 are on the Warsaw Pact side of the Iron Curtain. From this simple statistic it may be seen that the Soviet Union and its allies are well equipped to provide armoured support for a move against the West, whereas the best hope for NATO in the repulsion of such an onslaught is skilful use of anti-armour systems other than an opposing tank army. In any case, NATO's 7,000 battle tanks face 10,200 helicopter- or vehicle-mounted anti-tank guided weapon systems in addition to being outnumbered 2.5:1 by their direct counterparts. The East's situation is the opposite in that its tanks face only 7,400 mobile anti-armour missile systems.

It is clear, therefore, that NATO's tank-killing weaponry must be of the highest quality in order to overcome the Soviet threat. On the ground, there are the anti-tank guns and missile systems such as TOW, HOT, MILAN, Swingfire and Dragon; and in the air there are helicopters with TOW and HOT, plus fixed-wing aircraft carrying cannon, rocket pods, cluster-bombs and ASMs. No mean proportion of the West's airborne anti-armour force is provided by the United States Army and Air Force, the former with helicopters and the latter flying fighter-bombers and the highly specialized Fairchild A-10A Thunderbolt II.

Pending availability of the new Rockwell Hellfire missile, US Army aviation's principal anti-tank system comprises the Hughes TOW missile and the Bell AH-1S Cobra helicopter, each division having a Combat Aviation Battalion including 42 Cobras, plus reconnaissance (called 'Scout' by the US forces) and support helicopters. Though slower than the aeroplane in responding to distant threats, helicopters have the advantage of being able to stalk their prey with all the cunning of a game hunter, using natural features such as trees (and even hedges) to conceal their ultra-low-level approach to within firing range.

Custom-built tank-killer

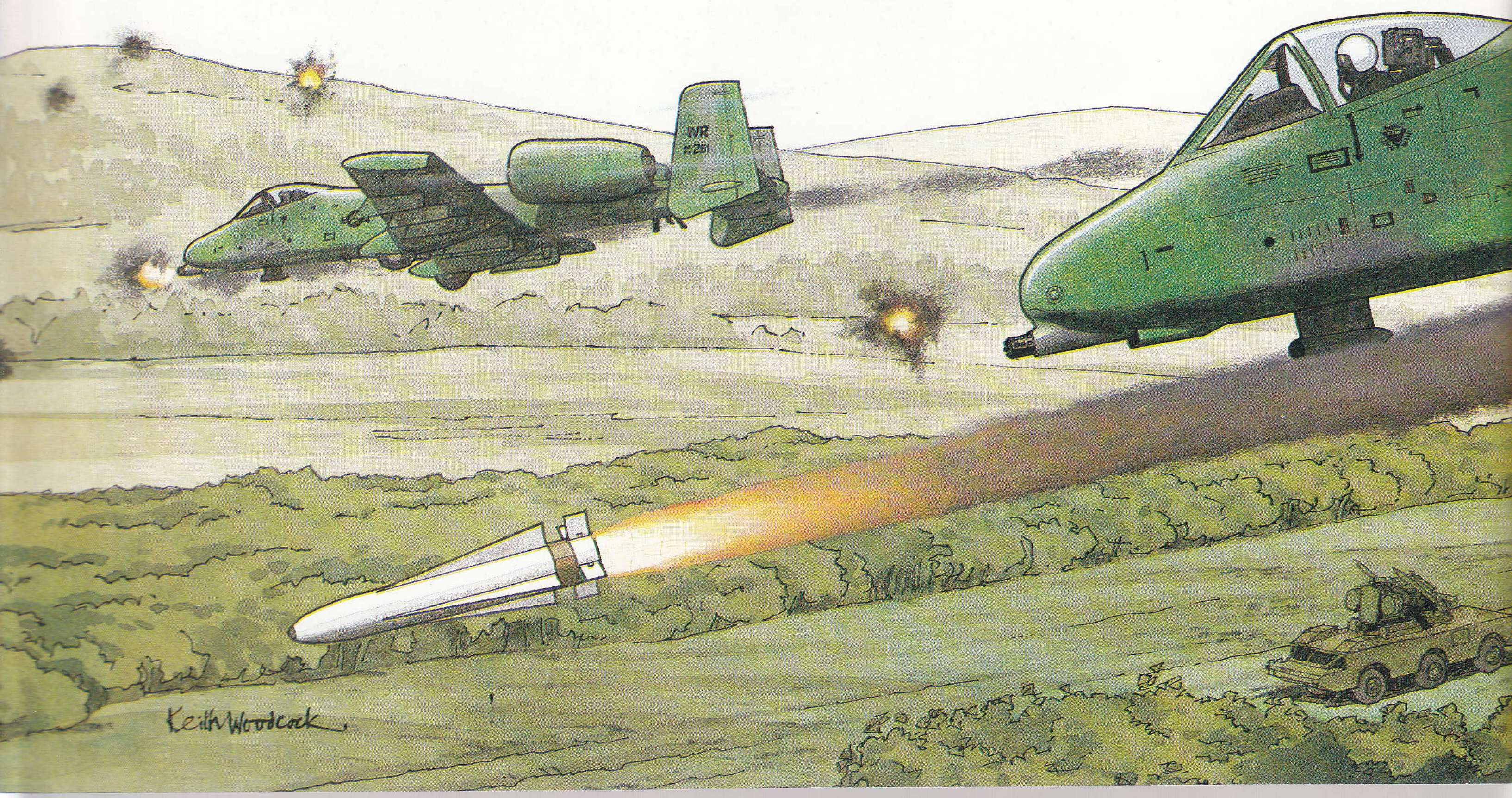
Fixed-wing aircraft operating in contested airspace over the battlefield are forced by their mode of weapons delivery to spend dangerously long periods (measured in seconds!) in full view of enemy air-defence systems, attracting SAM, AA artillery and even rifle fire. High-speed passes, though affording slightly more security, detract from weapon accuracy, so the only practical solution to the problem seems to be to make the aircraft capable of withstanding the tremendous punishment expected in such environments.

This has been the design philosophy behind the Thunderbolt. The result is one of the most ungainly aircraft ever built, but given the choice between a Thunderbolt and an aircraft which cannot fly home peppered with holes and with apparently vital parts of its structure missing, it is most likely that a pilot will forgive the former's lack of aesthetic appeal.

Thunderbolts ('Warthogs' to their friends) assigned to the NATO Central Front are operated by the 81st Tactical Fighter Wing, USAF, based at Woodbridge and nearby Bentwaters, Suffolk. Reflecting the importance of its anti-armour role in the maintenance of European security, the 81st TFW is the largest wing in the USAF and comprises six squadrons with a total of over 100 aircraft. During a conflict, squadrons would fly from six forward operating locations (FOLs) in Germany, four of which contain temporary deployments of eight Thunderbolts undertaking peacetime training: Sembach and Leipheim protect the approaches to southern Germany as part of NATO's 4th Allied Tactical Air Force, and Ahlhorn and Norvenich (2nd ATAF) defend the north. Names of the two 'war only' FOLs have not been released. A Thunderbolt leaving Ahlhorn can be at the East German border in 20 minutes, whilst Sembach is only 45 minutes from the Czech frontier.

Mission profile

For a typical anti-armour mission, the aircraft would fly some 240 km (150 miles), operating as a pair, and then remain on station for up to 1



hour, 10 times longer than the period expected from any other close-support aircraft. The Thunderbolt can operate at combat power for 30 minutes and still have a reserve of 20 minutes' fuel on landing. Low-level tactical navigation using significant topographical features is most likely to be employed, with experienced pilots being sufficiently familiar with their assigned operational area to mount a mission without pre-planning or carrying a map in the cockpit.

Once in the battle area, the Thunderbolt pilot would receive instructions from a forward air controller operating from a ground position or in an aircraft, typically a Rockwell OV-10A Bronco of the USAF's 601st Tactical Control Wing, based at Sembach. A regular feature of training missions is simulated enemy jamming of the controller-pilot radio link, whilst aircraft are invariably switched to targets different from those which they have been briefed to attack.

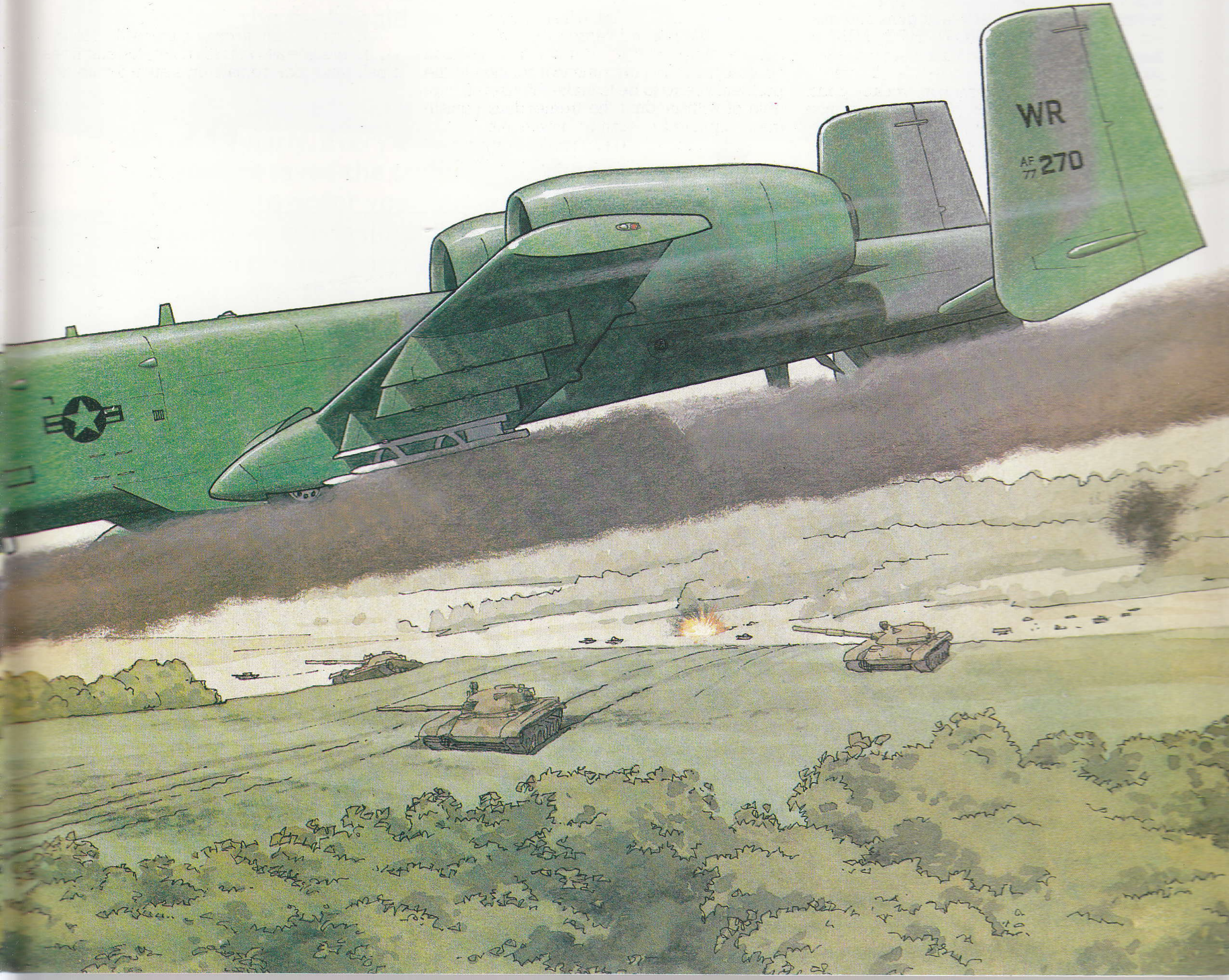
This is likely to happen often in wartime as a result of changed priorities in a swiftly-moving land battle, but the dawn-to-dusk rapid response service provided by the 81st TFW does not involve 'cab rank' patrols. Precious NATO anti-armour assets are carefully husbanded, and missions are flown as the result of requests by the army to take out specific targets, such as those which cannot be hit by the artillery. In some circumstances, Thunderbolts will coordinate their operations with army AH-1S Cobra gunships and Bell OH-58 Kiowa scout helicopters in the Joint Air Attack Team role.

During its 60 minutes over and around the target area, a Thunderbolt can launch Hughes Maverick TV-guided ASMs (four are normally carried) and make some 15 attacks with its high-powered GAU-8/A 30-mm rotary cannon. The GAU-8/A fires no ordinary ammunition, for each round is cored with depleted uranium which self-ignites on contact with the target. No nuclear reaction is involved in the military sense of the word, but the end result is almost as devastating.

Naturally, the enemy will engage the Thunderbolt with his anti-aircraft weapons, and those which are not deflected by AN/ALQ-119 jamming pods or unable to home in by infrared because of the carefully chosen engine position will strike a structure which incorporates a high degree of redundancy and thus enhances survivability. Back on the ground, two-thirds of the aircraft's area likely to take hits can be repaired in 12 hours, and 75 per cent within a day.

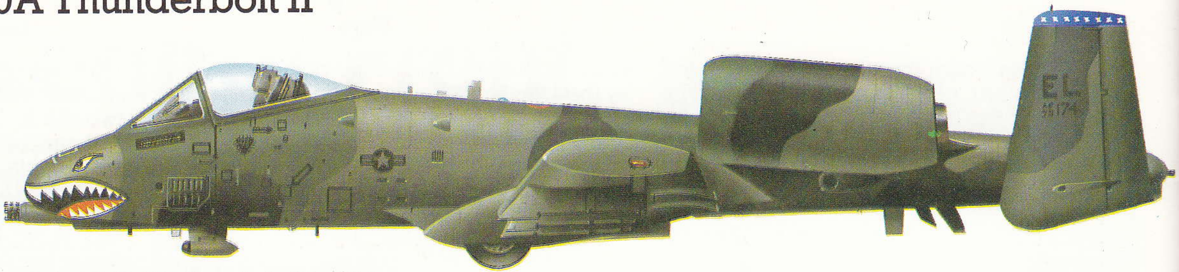
Thus, NATO's dedicated 'tank-buster' can usually be out on the flight-line the morning after receiving damage which would remove a lesser aircraft from the inventory. Considering the Warsaw Pact's massive superiority in armour, this is perhaps as well.

The Fairchild A-10 Thunderbolt II is optimized for low-level anti-tank operations over the European Central Front. Visualized here, a pair of Thunderbolts attack a Soviet armoured section using their infra-red guided AGM-65 Maverick air-to-ground missiles and GAU-8/A Avenger six-barrelled rotary cannon firing depleted uranium shells. Protected to survive small-arms and man-portable SAMs, the A-10s would rely on their low-level agility to escape the larger SA-8 on the vehicle below.



USA

Fairchild A-10A Thunderbolt II



Fairchild A-10A Thunderbolt II of the 23rd Tactical Fighter Wing, based at England AFB, Louisiana.

Produced in reply to an exacting specification of 1967 which called for a hard-hitting close-support aircraft, the **Fairchild A-10A Thunderbolt II** first flew on 10 May 1972 and was selected by the USAF in preference to the Northrop A-9 after a competitive fly-off. The Thunderbolt's unusual appearance derives from the care taken to enhance its survival prospects over the battlefield and incorporate maximum fire-power. Absorbing much of the centre fuselage is a potent GAU-8/A Avenger seven-barrel 30-mm cannon, the muzzle protruding slightly beneath the nose, which can be fired at the rates of 2,100 or 4,200 rounds per minute. Although unconventional, the engine location is considered optimum for minimizing hits by ground-fire, and has the additional advantage that the wing and tail mask the infra-red emissions of exhaust gases and therefore affords some protection against heat-seeking SAMs. A robust airframe, which includes an armoured 'bathtub' surrounding the pilot, has numerous constructional features resistant to battle-damage or conducive to swift repair, such as interchangeable (left or right) flaps, fuselage components, rudders, elevators and main landing gear legs. There are two primary hydraulic systems, each with manual back-up, and the landing gear can be extended under gravity if necessary. Well protected electronically by AN/ALQ-119 jamming pods, plus an AN/ALE-40 chaff and flare dispenser, the Thunderbolt carries a Pave Penny laser designation pod on a pylon to the right of the forward fuselage for accurate marking. In prospect is the far more advanced LANTIRN (Low-Altitude Navigation Targeting Infra-Red for Night) pod. Altogether the USAF has received over 700 aircraft, including **A-10B** dual control-trainers, whilst a private-venture two-seat **Thunderbolt N/AW** (Night/Adverse Weather) has been offered, as yet without success.

Specification

A-10A Thunderbolt II

Type: single-seat close-support aircraft

Armament: one internal General Electric GAU-8/A Avenger 30-mm seven-barrel cannon with 1,174 rounds; eight wing and three fuselage pylons for up to 7258 kg (16,000 lb) or ordnance, including laser-guided bombs and AGM-65 Maverick ASMs

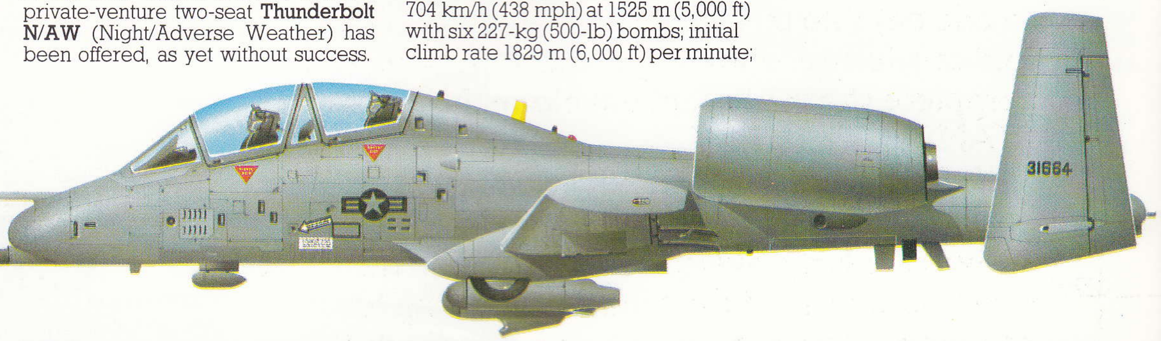
Powerplant: two 4112-kg (9,065-lb) thrust General Electric TF34-GE-100 high-bypass turbofans

Performance: maximum speed, clean 706 km/h (439 mph) at sea level at maximum weight; combat limit 704 km/h (438 mph) at 1525 m (5,000 ft) with six 227-kg (500-lb) bombs; initial climb rate 1829 m (6,000 ft) per minute; operational radius 460 km (285 miles) with 1.7 hours over target

Weights: empty operating 11321 kg (24,959 lb); maximum take-off 22680 kg (50,000 lb)

Dimensions: span 17.53 m (57 ft 6 in); length 16.26 m (53 ft 4 in); height 4.47 m (14 ft 8 in); wing area 47.01 m^2 (506.0 sq ft)

Fairchild A-10 N/AW (night/adverse weather) evaluator. Modelled on this aircraft, the A-10B is in production as a trainer, featuring a second cockpit and taller fins.



Below: Ground crew reload the A-10's GAU-8/A ammunition tank, which can hold 1,350 rounds of 30-mm depleted uranium ammunition, enough for 10 two-second bursts. The tank is extremely well protected as a hit in this area would destroy the aircraft.